





# COMPUTER WEEKLY

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## Ten years ago...

**COMPUTER WEEKLY** MARCH 13, 1969

THE IPO started demonstrations to users of an off-line data capture system that was said to have great possibilities... ICL won £780,000-worth of business from the East Germany as the Leipzig fair and further orders worth £3.5 million were said to be in the pipeline... The proposed takeover of Scientific Data Systems by Xerox was approved by both boards, and shareholders would be asked for their blessing at annual meetings on May 15... The first multi-access system for ICL's System 4/40 and 4/80 was launched by the company. Called Multitext, it provided an interactive version of Fortran and could handle up to 16 terminals... For the sale of an online investigation and data retrieval system with real time and batch processing aspects, Crown Agents were purchasing a Honeywell H1260 with 93K store, four tape decks, four disc drives and four video terminals in each of the main offices.

## Modata

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# COMPUTERVIEW

## The key to industrial survival

person, the greater the threat of unemployment.

We have witnessed tremendous changes in technology in the last 25 years and the technical demands placed on the software and hardware designers mean constant revision of ideas and adoption of new techniques at an increasing rate. Constancy is not a characteristic of the computer industry.

With this horizontal growth in technological application and vertical growth in complexity there has been a corresponding proliferation in seminars, courses and conferences. There is a course for the computer professional on any subject, however obscure.

But other changes are needed in the educational system and these are the attitudes necessary to cope with the effects of computers on employment levels.

In May last year, Tony Benn, the Energy Minister, called for a complete rethinking of our educational system. He urged increased education to cope with increased leisure time and the likelihood of shorter weeks and shorter working lives.

At the back of every working person's mind must be the fear of replacement by machine. This fear is often voiced by trade union leaders. The unemployed have no voice. The unskilled, unqualified 16-year-old of 1984 might never find work, but at the same time we have to harness the most sophisticated technology in manufacturing (and elsewhere) to survive as an industrial nation. This is our Catch-22.

Past Computerviews have urged governments to rethink the educational system to alleviate the effects of mass unemployment.

The current education programme hopes to place the key in the door. We must make sure it fits.

computer science courses at universities are about 50% higher than last year, a figure which clearly shows a recognition of the importance of computers (no doubt motivation for this interest includes high salaries, security in the seemingly endless expansion of the industry, and the many opportunities for those who "have Cobol, will travel").

But a knowledge and acceptance of computers do not open the door of economic salvation and prosperity. They are only a key to it.

Education, of course, does not finish with the completion of school or higher education. At whatever stage formal schooling finishes, sooner or later the adoption of new technology is likely to mean retraining. The less skilled the

## When small is beautiful and dangerous

THINKING small is hardly one of the DPM's more noted approaches to work. Over the computing generations, he has been conditioned to meeting the ever-increasing demands with bigger, better and often more complex resources.

However, all could now be about to change. According to Ted Cluff (CW, February 22), the Institute of Data Processing Management is not only conducting an industry survey on the impact of micro technology, but is also setting up a micro user group for businesses and the professions.

The DPM, it seems, will have to adapt to new techniques. No longer will an order be signed for that 64K mainframe with fingers crossed that an extra 64K memory will not have to be added on three months after implementation. He will settle for a 16-bit micro-based system and any upgrade would involve adding-on another micro with on-chip storage.

Full-scale feasibility proceed-

ures could well become redundant. Choosing between the rival merits of IBM and Honeywell could involve comprehensive power/performance/cost formulas. There is, however, less at stake, particularly in cost, when the choice is between an Apple or Pet.

For the DPM, selection in any case usually extends beyond that of pure cost. Factors such as back-up, engineering response time and delivery dates often weigh the scales of selection. Back-up for the micro, however, could well be the opening hours of the local byte shop, engineering response time, the period it takes to phone for advice or open the user do-it-yourself manual; and delivery schedules, the time it takes to unwrap a micro.

It is not just the work-style of the DPM manager which is facing the winds of change. Gusts are blowing towards the analyst and programmer. Not so long ago the DP team had an assured future. Provided technologies could keep pace with their pending requirements all would be well. No sooner had one technology been explored than another arrived. Before the DPM could mutter, Mass Array or Amdahl, a new technology bubble burst on the scene.

Computer databases were expanding almost as fast as the DPM's seat of power. But with the current emphasis on the

## 1984 and all that

THIS week's example of funny things people say in the media about computers was sent in by Steve Mangell of Southampton, who writes:

It all goes to show how stupid and malicious computers can be.

Alaric Cooke's Letter from America, BBC Radio 4, talking about credit agencies.

## Portable 'ring main' system

● From front page

providing each student researcher with a low cost personal computer that can also more powerful hardware software in the network as required.

An attractive alternative large time shared machine constitutes in effect a localisation of such services as Apple.

The Cambridge ring system may also have a strong appeal for certain commercial applications, notably where computer portability is required and distributed database systems.

The operating system component, Tripos, is at present single user, multi-task operating system that includes facilities for compiling, linking, and debugging BCCP, program, editor, and a file handler.

Fortran and Basic are expected to be added by the summer, with Pascal and Algol under consideration for later implementation. There are plans to adapt the system to multiple users.

The network hardware consists of standard twin-core cable and a number of data communication ports, one of which is required for each processor, on the ring (CW, 25 February 14, 1978). Data is transferred by the postmaster Mogabit per second and around the ring in 100 packets, only interrupting machine to which it is addressed.

Currently implemented printed circuit boards, about £1,500, the ring, likely to be available as a twin chip device in about 1984.

In the operational setting, Tripos is already running on three processor types: Computer Automation DEC's PDP-11, and the D General Nova.

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## Call for central agency to run £12m micros in schools programme

A CENTRAL agency should be set up to administer the government's programme for promoting microelectronics in schools, funding curriculum development projects and teacher training courses. That is the principal recommendation in a consultative paper issued by the Department of Education and Science. Interested parties are invited to reply by April 12.

The government estimates that £2.5 million a year will be spent on this programme over the next five years. The agency would have a steering committee with members from local authorities, teachers' bodies, and such organisations as the Schools Council, the Council for Education Technology, and the National Computing Centre.

The DES recognises that the agency's work could overlap with that of existing bodies and says that it must be able to co-operate with these. For instance, the programme might fund the introduction of new equipment for particular projects in schools, but the continuing supply of such equipment would remain the responsibility of local education authorities.

Computer-Aided Learning will be a particularly important part of the programme, not having established itself widely in schools so far, according to the DES. There will need to be an early assessment of the scope for expansion of CAL in schools and colleges.

Further education will also be involved in the programme, as will the implications of micros for vocational training, such as their effect on secretarial skills. Social effects, such as on employment, will however not be covered, nor will the technology of microelectronics itself. Applications is the central theme.

Patrick Raymond of the National Computing Centre, said that the organisational proposals "made sense", adding that he was pleased that the NCC would be included on the steering committee. The success of the programme, he said, would depend largely on the steering committee starting up worthwhile projects.

Assessing suitable equipment for use by schools and colleges will be another of the programme's tasks.

These plans are for England, Wales and Northern Ireland only. Separate work is being done on plans for Scotland.

## Timetable for Times technology agreed

THE thorny question of direct input by journalists at The Times, left unresolved by last week's agreement on talks between management and unions, seems likely to lead to a phased introduction over a number of years.

The National Graphical Association, the main print union, while sticking to the view that it should control all key-boardings, has agreed to the principle of timetables for the introduction of new technology and staffing levels, with "arrangements for future joint reviews."

After three months' suspension of The Times titles, a formula was reached whereby the unions agreed to talk in return for reinstatement and back pay for suspended staff. April 17 has been set for reopening publication. Any issues left unresolved by April 7 are to be referred to ACAS for conciliation; but this, unlike arbitration, would not be binding on either side.

At the same time, the Price Commission published a report on the request by the Daily Telegraph to raise its cover price. In this the Commission suggested that the Telegraph should proceed speedily with the introduction of new technology in order to keep down costs.

Detailed recommendations were made, and the advantages of direct input expounded. Industrial relations need to be improved and overmanning reduced, the report said.

Last week's accord at The Times has to be ratified by union members; so far only the NGA rank and file have agreed, but most of the other union general councils have done so.

Several other issues need to be sorted out with management, including a disputes procedure and efficient working arrangements "with a productivity deal."

An NGA spokesman said he thought it should be possible to restart production even if all issues are not resolved by April 17, but management is unlikely to agree to this.

Hitherto the NGA has refused even to talk about direct input. What seems most likely now is that a contract will be reached similar to that at Express Newspapers (CW, March 1) whereby NGA members will be given the job for a specified number of years, after which the matter will be discussed again. There could also be an arrangement for staff to have joint membership of NGA and the National Union of Journalists.

## Expanding micros in industry

A REPORT from the Committee of Directors of Research Associations has been sent to the Secretary of State for Industry, Eric Varley, outlining a £2 million programme for expanding the exploitation of microelectronics and the microprocessor in British industry.

A meeting between DoI officials and the CDRA is expected within a fortnight, at which the report's proposals will be discussed. These include plans to promote greater industrial awareness of microelectronics, the provision of more engineering training courses and places, the provision of long-term projects such as workshop training facilities, and the provision of wider and more comprehensive information services.

Some money for the programme is expected to be available from industry, with the DoI providing the balance.

## Doug Eyeions vice-president of CSA

DOUG EYEIONS, technical director of BOC Computing Services, has become the vice-president of the Computing Services Association, following the election of Jim Donaldson as president (CW, February 16).

Also taking up new appointments are Basil Cousins, of Computel, who will be chairman of the membership committee, and Ann Russell, of F International, who has become chairman of the external services committee.

## Post Office introduces fax service

FOR a limited facsimile service, to be introduced in the London and the North Eastern telecom communications regions, the Post Office has ordered 100 Siemens HF 1048 transceivers.

The Group 2 devices transmit or receive a full A4 page in three minutes and this is cut to two minutes where one HF 1048 is communicating with another. The facsimile machines will be delivered from Siemens at Congleton, Cheshire.

The corporation calls the service Fonofax, and will offer two other machines as well as the Siemens device. One will be the ITT Crowd 3500, and the other will come from an as yet unidentified supplier.

## 'Open government' proposals

THE government is expected to put forward proposals of its own for "open government," in competition with Clement Freud's Freedom of Information Bill, at the same time as the publication later this month of a survey of the operation of such laws in other countries. This makes it less likely that Freud's Bill will be given the extra time it needs in order to get through its Report Stage on the floor of the Commons (CW, March 1).

The proposals, which will probably take the form of a Green Paper, are expected to be in line with current policy of both front benches — that civil servants should be required to "consider" requests to see documents from members of the public but would not be compelled to disclose anything.

This is unacceptable to Freud and his supporters, who want a statutory right of access.

A survey of overseas experience, will go into the cost of Freedom of Information.

## £1.1m order

COMPLETING the reorganisation of its computing facilities around Honeywell hardware, Strathclyde Regional Council has ordered a second Level 66 miniframe and three Level 66 minicomputers, altogether worth £1.1 million.

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## GILB'S MYTHODOLOGY

### Need for training in program maintenance



LAST November, a New York client described a pressing problem to me. The maintenance people they had for their most critical online system (one with 1,800 terminal operators) kept quitting on them faster than they could be replaced.

The client was hiring recent computer science graduates, training them in assembler and the "system," only to find that they then decided that the pressure of 400 or more backlogged change requests, and a critical online system upon which hundreds of employees were dependent and with which the general public came into regular contact, was too much of a pressure.

They quit in six months. This led me to wonder aloud to them if they had similar problems with their maintenance people for the company's electrical systems in the field. Or for that matter did their supplier, IBM, experience similar problems of instability with their field maintenance people?

Maybe if we recruited atomic physics graduates to paint atomic reactor power stations, they would quit their job too? Maybe if IBM took experienced computer wiring technicians and asked them to do field maintenance there would also be some difficulties.

In the case of my New York client, I had the strong feeling that the candidates they recruited were not particularly trained or motivated for the job they were given. They only took the job because it gave them a start in industry, and they did not understand the nature of the work.

A month later I was visiting an old professional colleague at a Norwegian technical training college with a recently started

two-year training course in computers. My colleague had a simultaneous commitment to graduate computer science students at Oslo University, so it was natural that we asked the question of what difference there was between the technical colleges and university students.

There was one: in length-of-study, practical-versus-academic, and even quality of recruitment. But, the basic syllabus and orientation was not substantially different from what we have seen all over the world.

I raised the question of whether this technical college could consider training a specialist in program maintenance, either as a directly recruited two year study, or as a third year specialisation.

In almost any well established company using a computer, from 30% to nearly 100% of the programming staff are engaged in maintenance of some sort or other. There would seem to be a real need for people especially trained and motivated in this area. Yet I have never heard of a training programme especially for program maintenance.

It is possible that maintenance requires a particular type of person, who might be very different from those who lead projects, design systems, or code someone's pseudocode into Cobol.

It is possible that the vast array of tools and techniques which has surfaced to analyse program actions, aid changes and help with testing, requires in-depth study and orientation by specialists.

In today's immediate climate in several parts of the world, the demand for programmers is artificially high. This state cannot last, and we might well again see

over-production of computer specialists. This might be the time for both centres of training and employers to ask if some of the over-production should be guaranteed useful employment by being recruited and trained especially to solve the demanding problems of program maintenance.

The specialisation is necessary now. In the long run it is inevitable. I suspect our profession will be unusually slow in responding to the need.

Perhaps some readers are already engaged in some less formal recruitment and training for maintenance departments, and can report stable and successful professionals. Perhaps some training institutions are already training for this specialty. It would be interesting to hear if this is so.

## Q-Pac offers payroll service

HAVING taken over from Package Programs Ltd as the UK agent for Q-Pac (Software File, January 18), Q-Pac Services has forged a link with Southwark

## Sharp adds databases to time sharing service

FOUR new databases have been added by I.P. Sharp to those already available under the APL time sharing service.

Three are in the field of aviation and consist of the Official Airline Guide (US International Air Travel Statistics) and the T8 Air Charter Databases. Sharp is the first time sharing company to offer the OAG database, which contains data on 200,000 North American and international flights each month.

Also newly available is Petroseries, comprising historical time sharing data on production, stocks, and imports of crude petroleum products in the US.

With these additions, Sharp has brought up to 30 the number of databases it offers. They are concentrated mainly in aviation, banking, demography, economics, energy, and investment.

A discount you can't ignore for all educational users on Lear Siegler vdu's and printers

GTS, part of the Gamma Group, is now able to offer Lear Siegler ADM-3A vdu's and printers at 7 1/2% discount to educational users for a limited period. The ADM-3A vdu and printers are currently available ex-stock.



GTS is one of the UK's leading suppliers of Lear Siegler vdu's and printers and as such can provide you with the complete service that you require from your vdu/terminal supplier. Call or write to Richard Kenhill, Gamma Telecommunications Systems Ltd, 22 Market Place, Wokingham, Berks RG11 1AR. Tel: 0734 791384 Telex: 847630 or Jim Watt, GTS (Scotland) Ltd, 191 High Street, Kirkcaldy, Sth. Fife KY11 1JF. Tel: 0492-31180

## SOFTWARE FILE-1

### Aid to real time diagnosis and recovery on PDP-11

A PACKAGE that could be a very significant aid to those implementing real time systems on the DEC PDP-11 has been developed by the Software Products Division of John Bell Computer Services.

Called Radar (Real-time Aid to Diagnosis And Recovery), the new product provides in a package many of the logging, monitoring and recovery functions usually developed as part of the application. It thus ensures that such tasks are handled consistently throughout the application, while also offering a chance to reduce development time-scales.

Radar works by intercepting program calls to the operating system. Such calls are replaced in the user's program with a Radar macro, which passes the requisite data to the Radar task itself.

This is an 8,500 byte routine, written in Macro-11, that runs as a high priority task under DEC's RSX-11M, RSX-11D, or IAS operating system.

Radar supports user programs written in Coral, Fortran, or Macro-11 and one of its most useful functions is the documentation of program interaction in a multi-tasking environment.

Details of inter-task communication are written by the system to its logging file, and a report can subsequently be produced showing which tasks communicated to which, and when. This can be used not only to investigate processing bottlenecks, but also to unravel system "locks."

Another important system function is file security logging. Facilities are available for logging record images (and data areas) both before and after updating, and the images can be used to restore the file in the case of a system crash or corruption.

Where the difficulty of re-

creating a situation exists on the validity of error corrections, the Radar log before failure and during the restoration compared to ensure that a correction has been tested under the same conditions.

A further problem addressed by Radar is error checking. Frequently treated casually in user programs, error checking is returned by the operating system as screened consistently.

Radar will be marketed by UK by John Bell's software products division and in the US Germany by subsidiaries of John Bell Group. It will be at around £1,500.

## Comprehensive BOM written in Dibol

A COMPREHENSIVE bill of material processor operating on DEC PDP-11 systems is being marketed by Houds Computing, of Stafford. Written in Dibol, the software requires a minimum configuration of a 64K 11/34.

Up to 100 levels of assembly breakdown can be handled

by the system, which implements the basic BOM level and multi-level explosion and implosion functions. It is used to support production control, inventory control, and inventory control.

Among reports that can be produced are: a bill of materials, a manufacturing shortage stock status report, a production schedule.

A significant feature of the system is that it is interactive. A system manager operator processing programs are self-processing.

Houds, which notes the system is suitable for shop and mass production environments, obtained the software from the US and permanent licence at a user price of £8,250.

## Zeus-Hermes reorganisation

THE three other companies making up the new reorganised Zeus-Hermes (Software File, March 1) Zeus-Hermes Ireland, Zeus-Hermes Recruitment, and Plum Designs — a graphics printing company based in Albans, Herts.

## Special travel arrangements to visit the Compec Europe Exhibition (Brussels)

IPC Electrical-Electronic Press Ltd., the world's largest publishers of computer, electrical and electronic journals, have made special arrangements for readers wishing to visit the Compec Europe Exhibition. The cost includes travel by scheduled airline from

Hestonrow in London. The cost includes travel by scheduled airline from Heathrow in London. The cost includes travel by scheduled airline from Heathrow in London.

## SOFTWARE FILE-2

### Commercial users take keen notice of 'academic' language

EVIDENCE that BCPL is emerging rapidly from the underground and fast finding favour with a wide variety of users was available in plenty at the inaugural meeting of the BCPL users' group, held in Cambridge last week.

Surprising even those who arranged it, the meeting attracted nearly 80 delegates, including users from several European countries and many commercial organisations.

Notable companies attending included Ford, Siemens, Saab Scania, Marconi, EMI, Redifon, and Logica. All of these, it emerged, had either completed projects in BCPL or were currently in the middle of development.

Also in evidence were a number of major scientific and research establishments, including the Rutherford Laboratory and CERN, of Geneva.

With usage growing fast and implementations proliferating, one of the major objectives of the group is to define a language standard.

Although now 12 years old, and relatively stable for the last seven, BCPL would benefit, it is felt, from a written definition. This would naturally include the language core but is particularly important in the case of the run-time system and the controversial area of language extensions.

That such proposals may now

be taken seriously indicates the progress made by BCPL since three years ago, when the circulation of a draft standard was met with a resounding silence.

The observance of a strict standard by compiler writers would, of course, help to enhance the high degree of portability already enjoyed by BCPL applications.

Portability is one of BCPL's principal advantages over its usual competitor — assembler — and was a recurrent theme during one of the group's most informative sessions, in which users discussed their applications.

A typical example was that of CERN, where users have access to a very wide range of machines and expect to find identical software tools on each. BCPL had been used there to build machine-independent user interfaces and utilities such as editors and text processors.

A major application had been the construction of a comprehensive network linking the machines.

Among those using BCPL for application programming were Ford and Siemens. Ford, for instance, had written a quality, repair, and surveillance system for a PDP-11/04, while Siemens had used BCPL to program its Telemeter-M process control automation system.

Initially built round the Intel 8080, the system had subsequently been implemented using

AMD 2800 bit slices and the same software. BCPL had been chosen for the application precisely because of the freedom it gave to make use of alternative hardware.

Siemens was also considering using BCPL to develop system software which would be consistent across its complete processor range.

Other interesting applications discussed included the development of the Scrapbook text database by the National Physical Laboratory. Originally written in BCPL for Modular Ones, the system had subsequently been adapted by Triad Computing Systems for PDP-11s running under IAS.

Triad also reported it had developed a large database in BCPL for the Royal Aircraft Establishment, Farnborough.

A cautionary note on performance was sounded by a

speaker from Saab Scania, in Sweden. Saab, he said, had started using BCPL for real time simulation about a year ago, running on PDP-15s. Although the experiment had been a success, and they were currently implementing BCPL for an SEL 32/75, their experience suggested that programs ran two to three times slower than the equivalent assembler.

BCPL is not known to be supported by any manufacturer, which reinforces its "underground" status.

Apart from Siemens, the only other manufacturer represented at the meeting was GEC, which makes a BCPL compiler available through its 4000 series user group.

Given the lack of official support, the user group will act as a self-help organisation and one of its major aims will be to set up channels for the exchange of

information and programs.

This will almost certainly take the form of a regular newsletter, along the lines of that distributed by the Pascal user group. The first issue is likely to appear in the next few months, probably under the editorship of Jack Lang, from Topeexpress.

Toltec Data, of Cambridge, has agreed to act as the initial secretariat for the user group, which plans its next meeting around the end of September. The group can be contacted c/o Toltec Data Ltd, 24 Thompson's Lane, Cambridge. Tel: (0223) 312347.

## MVS performance monitor

THE argument that CAP-CPP's new MVS performance monitor, CME, is competitively priced was weakened by a significant omission from last week's story

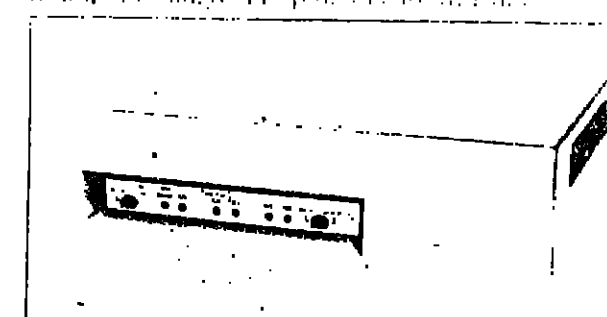
(Software File, March 8). Unlike IBM's RMF II, a single CME licence is valid for multiple CPUs; most UK MVS users run it on at least two processors.

## Data Transmission Managers know IAL ...do you?

IAL is an international leader in data communications. It provides a brilliantly comprehensive, continuously expanding range of data transmission equipment; compact, flexible, state-of-the-art equipment based on a unique understanding of user needs and indeed, on a list of international users which is itself unique.

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2400EP is a synchronous 2400 bps modem which



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## OP SPOT

# How a UK ops man in Tehran weathered the Iranian revolt

WHEN a bazooka shell exploded within 50 yards of his apartment, Grenville Mills decided it was time to get away from the civil troubles of Iran.

So he took advantage of an escape clause in his contract and resigned from his position as data centre manager at the Tehran installation of Iran Air.

Mills, who arrived in London last week, told me, "It's all calmed down now, but I won't be going back to work there."

"I would have come back soon after that incident — at the height of the Islamic revolution — but the evacuation flight tickets cost £350 each, and so I waited until Iran Air could fly me back."

The revolution, and the slow build-up to it, with its rejection of Western ways, made the management of his 20 Iranian operators progressively more difficult.

Keen to put his comments in perspective, he said, "The politics of the situation are not my concern, they are the business of the Iranian people."

"From my viewpoint, it's a shame that the unrest occurred, as it prevented me from making full use of the potential that

Bernard Allen interviewed Grenville Mills in January 1978, just before Mills left England to become Data Centre manager at the Tehran installation of Iran Air. At that time there was no indication of the troubles

exists there, in terms of the people and other resources.

"In the end, I was acting in a sort of managerial and technical advisory capacity, really."

Mills, and the six other Englishmen at the installation, put forward a number of ideas and suggestions. Intended to improve the performance of the company's two 370/158s. Many were accepted, but they were applied less and less as the troubles increased.

Throughout the time he was at the site, one of the systems was dedicated to the running of the Airline Control Program, ACP, while the other provided back-up for it. The second machine was also used to process development work.

Typically, dumps would be cancelled by the operators for the most trivial of reasons, and deadlines were not always adhered to.

Said Mills, "We tried to get the Iranians to see the operations department as a means of providing a service to the user. That

wasn't always easy."

They set about implementing input and output controls, and writing technical manuals to be used for operator training.

He continued, "We had to get the manuals printed in Farsi as well as English, because despite the fact that they all had an excellent command of the English language, they were reluctant to make use of it."

Mills pointed out to the company that by using the second machine for back-up purposes only, it was wasting valuable resources and missing out on the opportunity to make a considerable amount of extra income. He suggested that they sell bureau time.

"You see, airlines must ensure back-up for their booking systems. So we had an IBM 370/158 practically idle. It was an ideal set-up to do some bureau work."

"I proposed a bureau contract — which we could then have offered to other companies which would have undercut the IBM rates by a considerable amount. In the end, the idea was not used."

He suggested that the IBM VM operating system be implemented on the existing machine, on the basis that it would add flexibility to the scheduling of the workload.

"The Airline Control Program is a stand-alone operating system, and worked fine for us as far as the live system was concerned," he said.

"But each time we wanted to carry out development work on it, OS had to be kicked off the testing machine. And as the operators insisted on running the development work during prime shift, it meant that the programmers were not getting machine time when they most needed it."

The company accepted his advice, and by August the VM project had reached the system

that were to arise over there. In this interview, Mills discussed how the political unrest, and eventual overthrow of the Iranian government, affected him in his work.

generation stage. However, by that time the unrest was beginning to manifest itself to a considerable degree and as a result no further progress was made.

Mills also put forward a number of ideas relating to hardware which, again as a result of the unrest, never got as far as implementation.

"I suggested that the company install T-Bar channel used is a great waste."

According to Mills, the complex is equipped with a top class, almost "fail safe" back-up power supply.

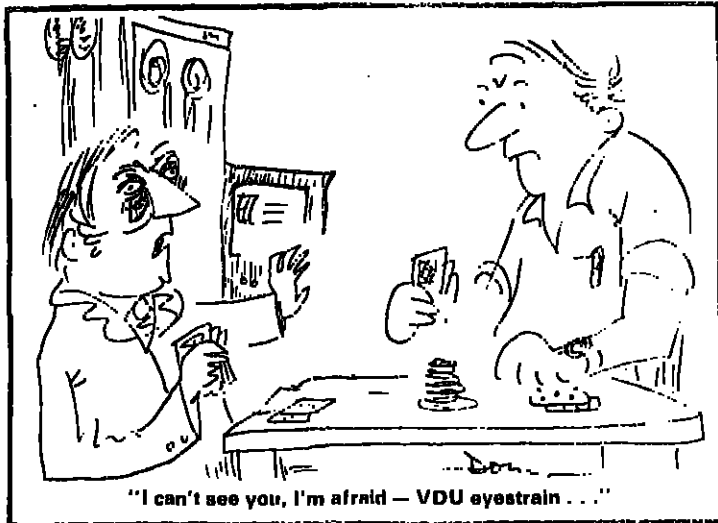
"Over there the power supply is likely to be cut off at any time. To overcome that problem, the new complex has a UPS, uninterrupted power supply system. If the power supply is cut off, storage batteries are brought

into use immediately. And if the main supply is off for any considerable time, generators are switched on. It's all done automatically, marvellous."

The new complex was to house three IBM 370/158s — the additional machine was needed to run MEMIS, an engineering maintenance and supply system. Iran Air was on the verge of accepting both hardware and software, when the revolution broke out.

"The third machine would also have helped us with the actual re-location — taking back-up considerations into account."

On a more personal level, Mills was naturally concerned for the



"I can't see you, I'm afraid - VDU eyestrain..."

switching equipment in place of the IBM 2014 switching units in use at the site.

"The T-Bar switching units are excellent — they give you dual channel availability on three machines, which was in line with our expansion plans."

"They also give you great flexibility as regards the scheduling of resources. In addition, they are simple to operate, with very little scope for error."

As a result of the troubles, an intended move to a purpose-built computer complex, sited near Tehran airport, was not made.

Said Mills, "It is a superb complex with all the facilities a computer installation needs. The fact that it has never been

used is a great waste."

According to Mills, the complex is equipped with a top class, almost "fail safe" back-up power supply.

"Over there the power supply is likely to be cut off at any time. To overcome that problem, the new complex has a UPS, uninterrupted power supply system. If the power supply is cut off, storage batteries are brought

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## PEOPLE AND EVENTS

## Computer Automation changes

COMPUTER AUTOMATION has appointed Maria Glazebrook-Sack as managing director. He succeeds Geoffrey Salkeld, who has become deputy chairman in addition to his position as vice-president of European operations. Glazebrook-Sack was a founder director of Telex International, after working for nine years with IBM. Reporting directly to Salkeld as European financial controller is Christopher Birks. He joins Computer Automation from Memorex Europe, where he was treasurer for Europe, the Middle East and Africa.

Bernard Lavelle, formerly production controller with Tally Information, has been appointed sales office administration manager for the company.

John Hayes has been appointed territory manager, East Midlands, for Computer Machinery Company. He has worked for CMC's technical support division for the past three years, but in his new capacity he will be responsible for all sales in the East Midlands area.

Michael Shacklady has become a development engineer with Dicol Electronics. Before joining the company, he was control technologist with Mars, concerned with the design and development of electrical and electronic control systems. Shacklady, who has also worked for Roneo Vickers and RHM Foods, is an associated member of the British Institute of Management.

Gerald Fleming and Donald Pate have been made vice-presidents in international operations for Northern Telecom Systems Corp. Fleming recently returned from London where he was general manager of Data 100 Corp's European marketing activity, and is now vice-president, marketing development. Vice-president, international distributor sales, is Donald Pate, who was formerly director of international sales for Sycon. He joined Sycon in 1971 as a district sales manager and was later promoted to director of Far East marketing.

Derriek Maddern has been appointed sales manager for Teleprinter Equipment of Tring. He worked for the sales and marketing division of Cable and Wireless for the past 22 years.

## DIARY

**MARCH 18-21**  
IBM - the next five years. Infotech State of the Art conference. Hotel Sofitel, Paris. Contact Dave Bates: 0623 35031.

**MARCH 20**  
Logie for databases and programs. R. Kowalski. BCS Formal Aspects of Computing Science Group. Polytechnic of Central London, London W1. 18.30.

**MARCH 21-22**  
Recent developments in point of sales terminals. IEE/IERF Computer group. Royal Institution, Albemarle Street, London W1. 10.00.

**MARCH 21**  
Visit to IBM ISI Cosham. BCS Hampshire branch. IBM Information Services, Cosham, 18.00.

**MARCH 22**  
Mk. microprocessors - from the user's point of view. Dr. E. O. Ashworth. IEE/E. Leicester Polytechnic, Leicester, 18.30.

**MARCH 23**  
CAFS. BCS Preston branch. Blackburn Technical College, Blackburn, 18.30.

**MARCH 21**  
Practical privacy. Ted Cluff. IDPM Central London branch. Pearl and Dean Studio, Broadwick House, Broadwick Street, London W1. 18.00.

**MARCH 21**  
Systematic Kit Grindley. BCS Cobol group. BCS, 13 Mansfield Street, London W1. 14.15.

**MARCH 22**  
The world of microprocessors. European Study Conference. Hyde Park Hotel, London SW1. 9.00.

**MARCH 23**  
Visit to Royal Sussex County Hospital. BCS Sussex branch. Postgraduate Medical Centre, Eastern Road, Brighton, 18.30.

**MARCH 23**  
Mechanical handling and sorting of mail. P. J. O'Doherty. IEE/E. Watlington Community Centre, Watlington, Oxford, 18.30.

**MARCH 24**  
The micro revolution and Horizon. 'The Chips are down'. BCS Manchester branch. NCC Oxford Road, Manchester, 18.30.

**MARCH 25-27**  
IBM CUA Local authorities group. County Hall, Exeter, 14.00.

**MARCH 22**  
Designing the system for people. J. Dadds. BCS West Herts branch. Heath Park Hotel, Hemel Hempstead, 18.30.

**MARCH 23**  
The role of large computers in the 1980s. Prof. F. Sumner. BCS Wolverhampton branch. Lecture Theatre C7, the Polytechnic, Wolverhampton, 18.00.

**MARCH 25-26**  
Vacation school. IEE. University of Oxford, Oxford. Register IEE Secretary, ref. LS(DA).

**MARCH 28-30**  
European Computing Review. Infotech. The Connaught Rooms, London. Contact Dave Bates: 0623 35031.

**MARCH 29**  
Achieving project plans, seminar. Association of Project Managers, Jersey. Contact AFPM, 01-798 3182.

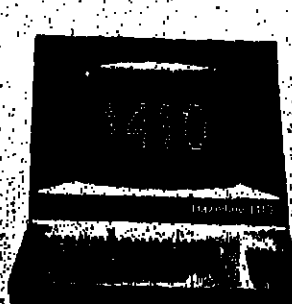
**MARCH 29-30**  
Business game BCS Nottingham branch. Book teams through Margaret Morley, Cripps Computing Centre, Nottingham University, Nottingham, 18.30.

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Business game BCS Nottingham branch. Book teams through Margaret Morley, Cripps Computing Centre, Nottingham University, Nottingham, 18.30.

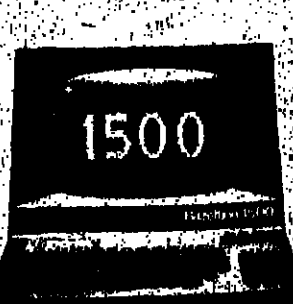
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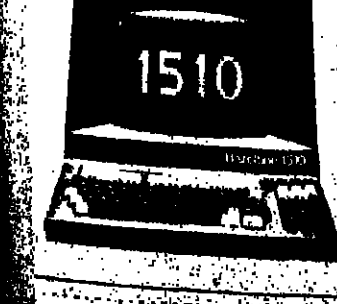
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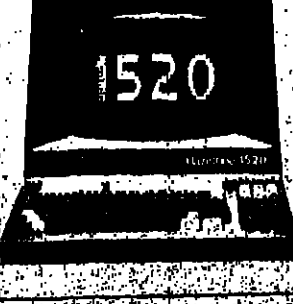
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By Judith Morris

## Fellowship

IN recognition of his work in satellite and space technology, Dr John Preece has been awarded the fifth Macdonald International Fellowship. Preece, a professor of engineering at the California Institute of Technology, has been granted more than £5,000 for his research in satellite and communication circuits.

The Fellowship was established in 1974 on the 50th anniversary of Macdonald's death and is administered by the Aspen Institute for Humanistic Studies, Colorado.



Cronin



Flynn



Florentinus



Finet



Allen



Guthrie



O'Reilly

Eugene Cronin has been appointed vice-president, Europe, for Documentation Incorporated. He previously held the position of vice-president of administration for the company, and in his new role will be responsible for the company's European operations.

Michael Flynn has become general manager of the Magnetics division of BPC Business Forms group. The division was recently formed to market computer magnetics throughout Europe and the UK. Flynn was formerly employed by Pylar of Paris, where he was involved in the manufacture and marketing of computer magnetic products.

Jacques Florentinus has become manager of the Paris centre of University Computing Company. Finet, who is a graduate in electronic engineering, has worked for several years as a systems engineer with ICL in France. He has also worked in the marketing sphere for SIA and then Frantab. In his new position he will be responsible for the business operations of UCC (France).

Len de Jager has been appointed senior technical support engineer for Compeda's team in Holland. He was previously a project engineer with Shell Internationale Chemie Mij in The Hague. Joel Florentinus, formerly with Crawford and Russell, has become a senior technical sales consultant. He has also worked for Marconi and with the Control Systems Centre at UMIST, Manchester.

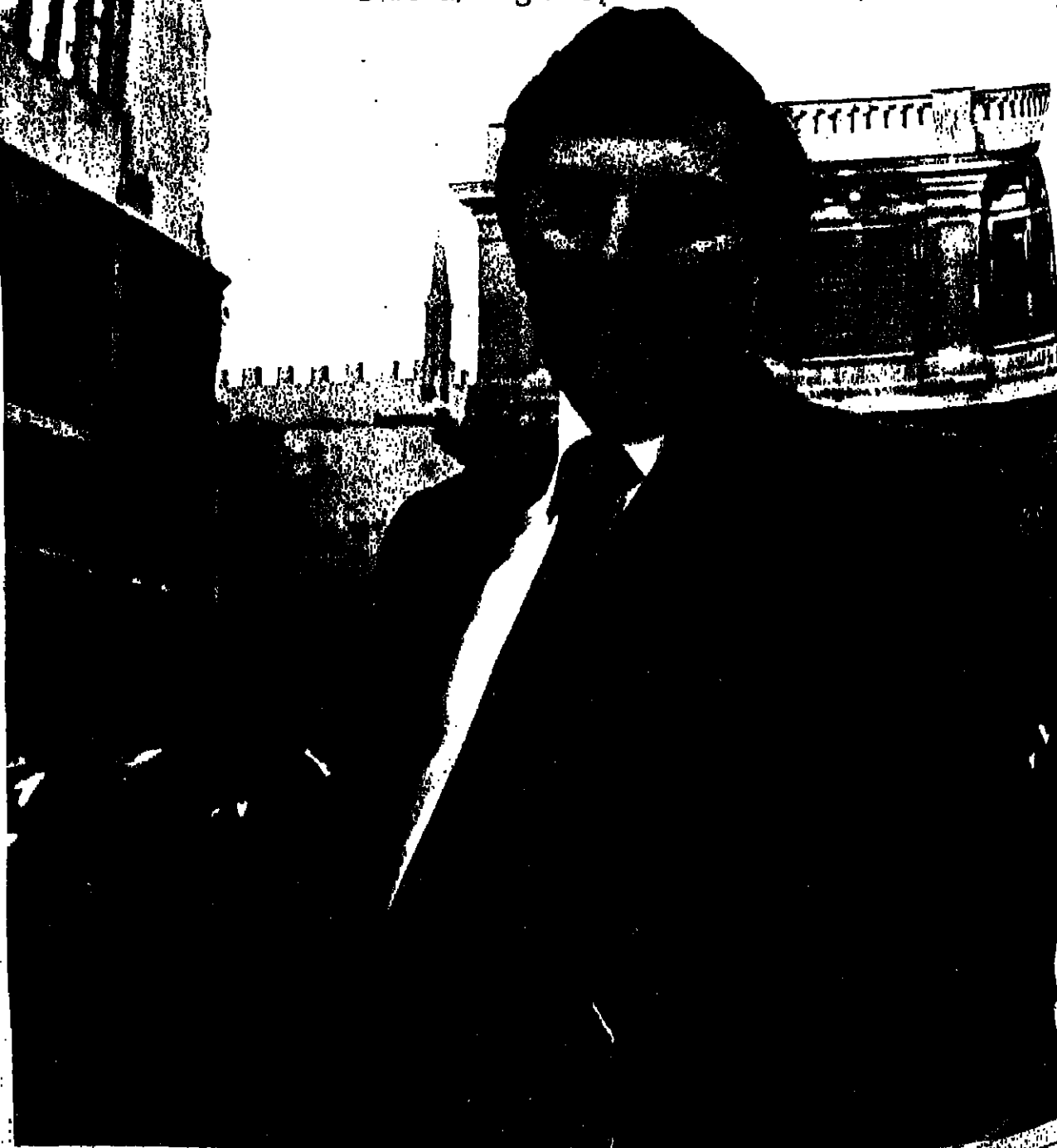
Les O'Reilly has become director and general manager of Eastern Computer Services, Peterborough. Previously he was production director with the company, and before that was general manager of the retail division of Geant, the company's parent organisation.

Brian Dix has become managing director of Nollon Communications. He was previously managing director of Ultra Electronics at its associated company, Ribbond Printed Circuits.

Dave Lawrence has joined Allison Computer Media as Southern area manager. He was previously data centre manager with DP Advisers, the South London bureau.

# VAX: "An implementor's dream."

Dr. Brian Ford, Director, Numerical Algorithms Group  
Oxford, England/Downers Grove, Illinois



## Power board to update

A DUAL IN LINE 2872 and a 2860 are to replace the System 4/72 and System 4/70 at the South of Scotland Electricity Board. The board will be making use of the ability to use storage and peripherals with the 2860 before being transferred to the main installation.

Initially, the 2860 will be used for program development and conversion. Some programs, however, will not be converted at all, but will ultimately run on the 2860 under DME System 4. Among new applications to be developed are a plant scheduling system and a terminal network system.

## Mainframe change for bureau's UK users

GSI, the giant French-owned bureau group which intends to provide its bigger time-sharing clients all over Europe with in-house mainframe processing (CW, March 8) will offer an as yet unannounced machine to its UK customers rather than the IBM 4300 computers being offered to Continental clients. But the Digital Equipment 2020 would definitely be offered here.

GSI UK, formerly CRC, said that GSI in France had already started offering 4300s to customers there but pointed out that there were no plans to offer 4300s in the UK.

The other interest in the DEC 2020 in the UK was as a possible replacement for the three obsolete RXDS Sigma 8s at Slough which form the centre of the time sharing service marketed throughout Europe by GSI.

The in-house service to be offered by GSI will be similar in concept to the Onsite service offered in the US and Europe by Automatic Data Processing. Onsite is a comprehensive package comprising ADP software and support and DEC 2020 hardware, all provided by ADP as a complement to its time sharing service.

## Powerful rival to 3033 from ITEL

ITEL can now offer IBM users a more powerful alternative to the 3033 at lower cost. In the form of the AS/6 Attached Processor, the AS/6 AP is rated at more than 4.8 mips, compared with 4.7 mips for the 3033 and 2.6 for the existing AS/6. The latter is ITEL's more powerful alternative to the 3032.

The cost per mip of the AS/6 AP works out at about \$370,000, says the company, giving it a

price/performance of 63% if the 3033 is taken as 100%. According to ITEL the comparable Armdahl machine, the V/8 II, is 65%.

The AS/6 AP provides AS/6 users with an easy growth path and like the AS/6 is built in Japan by Hitachi.

ITel already offers direct alternatives to the IBM 3031 and the 3031 AP in the form of the AS/5-7031 and the AS/5-7031 AP. ITEL says that price/performance figures of these machines are between 70% and 80% of the 3031s. Their mips ratings range between 1.2 and 1.8.

While its AS/5 and AS/6 machines still beat their IBM counterparts in price/performance, the AS/3-5, announced two weeks ago as a counter to the 4341 (CW, March 1), costs more than twice as much to purchase as the 4341, mainly because the latter comes with very inexpensive memory based on 64K bit chips.

But ITEL has adopted a policy of offering the AS/3-5 on a short lease of 18 or 24 months at charges that are 20% less than the rental on a 148. So the AS/

3-5 could be a less expensive alternative for a small 370 user who needs extra power now and cannot wait for a 4341 to be delivered.

Unlike the 148 the AS/3-5 more than matches the 4341 in power and ITEL hopes that at the end of the short lease period many AS/3-5 users will agree to renew their lease contracts at new rates which will be much lower and which will compare favourably with the 4341. In this way the AS/3-5 user could be persuaded to keep his AS/3-5 instead of renting a 4341.

Alternatively, the AS/3-5 user can purchase his machine from ITEL at the end of the short lease period with a significant discount.

ITel can deliver an AS/3-5 within six weeks and provides MVS support with the machine, a provision which is not available from IBM with its 4341.

The AS/3-5 has a power rating of one mip and has superseded the two original AS/3 machines and the AS/4. The latter was ITEL's original answer to the 148, but like the 148 is dramatically outperformed by the 4341.

## MP/200 uses 'half-card'

THE high speed bipolar version of the Micronova microcomputer, the MP/200, introduced last week by Data General (CW, March 8), is built around the same AMD 2900 series bit slice chip set as the Nova 4 family announced late last year (CW, December 21/28, 1978).

The essential difference between the MP/200 and the smaller Nova 4 machine, the IC, is

that the AMD 2900 processor in the IC is contained on a 15in x 15in board along with 32K words of memory, while with the MP/200 it comes on a 7in x 7in board. The latter can be slotted into the 8-slot chassis used by the smaller MP/100 Micronova system, so that an MP/200 can simply be replacing the appropriate IC board.

## Eurodata results to be held on Infonet

RESULTS of the 1979 Eurodata study will be held on Infonet, the Computer Sciences Corp remote computing service, and be accessible via dial-up lines to the 17 European PTTs and the Eurodata Foundation which

commissioned the study last year (CW, March 9, 1978). Logica, which undertook the £1 million study, is now processing the information gathered from the PTTs and from interviews with over 4,000 users.

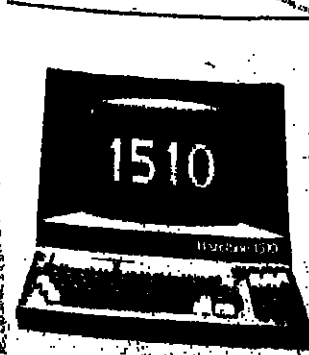
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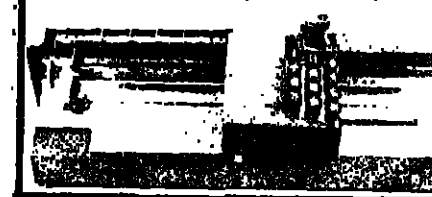


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**COMPUTER WEEKLY**



MICRO NEWS

# Master slices the key to complex circuit definition

THE problems of defining circuits of increasing complexity, as suggested by Intel president Dr Gordon Moore, in his keynote address to the International Solid State Circuit Conference (CW, February 22), are already being taken on by the big systems houses to a much greater extent.

One session of the conference was given over to one way in which the problem is being solved — large scale integration logic arrays, or master slices.

These take the array philosophy established with the programmable logic array (PLA) and uncommitted logic array (ULA) a stage further, by committing to silicon an array of logic cells, or circuits, rather than the individual devices of the PLA and ULA approach.

By using a basically standard array, circuit designers are then

**IN this second report from the International Solid State Circuit Conference, recently held in Philadelphia, Pennsylvania, USA, Micro News looks at the new generation of semiconductor devices, known as master slices, that could make systems manufacturers pre-eminent in the semiconductor business.**

able to define the necessary interconnection pattern on the chip required to form the desired circuit configuration.

Though not able to fit all possible applications of microelectronics, the master slice approach does overcome many of the problems set out by Moore in his keynote address.

Basically, he was saying that circuit definition for the general semiconductor manufacturers was becoming increasingly difficult as the potential com-

plexity of the technology increased.

Though an ever-growing number of functions could be integrated into a single circuit, the greater degree of integration, the lower the number of potential applications for any circuit designed.

Only memory components utilised the full capabilities of the technology while remaining general enough in application to find wide market use.

By standardising the circuit design and processing as much as possible, circuits that utilised a greater proportion of the available complexity were now possible, while retaining an economic design cycle, and still have only limited applications use.

Several companies presented papers on the master slice theme, including IBM, which has re-emerged in recent months as a leader in semiconductor technology from a period in which it looked as though it had lost touch with the pace of technological development in the industry.

IBM already has one master slice device in operation in its recently launched 4300 series equipment. This is used as a peripheral controller in the 3880 disc system.

The slice from which this controller is designed consists of 1,486 gates, organised into 748 logic cells. These cells, which are primarily constructed of two standard ECL circuits, are themselves organised into a 34 by 22 matrix in the centre of the 48,000 square mil chip, and are surrounded by 64 driver circuits and 38 receiver circuits on the chip periphery.

Between them, these realise 94 TTL-compatible I/O lines. The driver circuits are driven by a +5 volt power supply, while the logic devices and receiver circuits are driven by a +1.7 volt supply.

Already in manufacture at IBM's East Fishkill, US, plant, the devices are designed using the company's engineering design system. This is used not only for actual logic simulation and circuit design, but also for generation of the necessary test routines for the device.

Design rules for the master slice appear to be loose, for the quoted geometries are line widths of 5 microns, and line spacing of 6 microns, well below state-of-the-art capability.

## Imsai's UK dealerships

THREE companies, including Imsai, have written to Micro News following the story on Data Precision's "exclusive" UK dealership for Imsai microcomputer systems (CW, February 15).

The companies, including Computer Mart of Norwich, and Corner Computing Services of

A total of eight masks is used in the manufacturing process, though only three are involved in the design of a specific circuit. These are all metallisation layers, two being for personalisation of the circuit, and the third for I/O and power bussing.

In the application already operating, an 87% utilisation of the available cells is achieved in the circuit design, and according to IBM this degree of utilisation is repeatable.

The packaging of the device is in a 115-lead package using a ceramic substrate. To connect the chip to the substrate, a solder-bumped flip-chip technique is employed, rather than gold wire connection.

Another master slice device described at the conference came from Japanese manufacturer, Hitachi. It has already manufactured a prototype line control unit using the circuit, and says that it is particularly suitable for fabricating peripheral control devices.

Using  $^2\text{L}$  technology, Hitachi's master slice packs 5,000 logic gates into a 39,500 square mil chip area. The slice is organised as 124 basic cell blocks surrounding two programmable logic arrays, which are used to configure the required logic functions. Typical gate delays of 10 nanoseconds are quoted for the device.

In the line control application, gate utilisation is 41.5%. Even with this relatively low figure the circuit, packaged in a 42-pin dual in-line pack, replaces 41 SSI and 18 MSI components previously needed for the application.

An alternative design of master slice was outlined by Siemens at the conference. Though its chip, at 54,500 square mils with 712 gates, is the biggest of the three devices described, and has the lowest gate count, the part offers a considerable potential advantage by having on-board RAM as part of the slice.

Produced using the company's Oxide bipolar process, the device can realise circuits that are extremely fast. Internal gate delays of 500 picoseconds are quoted, while the 128 byte internal RAM offers a 3 nanosecond access time.

An initial application developed using the slice is a fully microprogrammable 4-bit microprocessor. This features a read-modify-write cycle time of 20 nanoseconds and an ALU offering three arithmetic and five logic operations on two source operands selectable out of five input sources. The operating frequency is 50 MHz.

Siemens feels that 16- or 32-bit systems with a 20 MHz frequency are possible using multiples of this master slice device.

## ROM firmware for Apple II users

A RANGE of ROM-based firmware packages is being introduced by Apple Computers for its Apple II computer system. Known as Programmers Aid, the packages offer capabilities such as high-resolution graphics and

tape verification, tone generation, RAM testing and machine language program relocation. For use with Apple's Integer version of Basic, they are designed to relieve the programmer of a wide range of utility tasks.



By Martin Banks

Secretary Sue Widdows demonstrates the use of a card reader at the Office for Swindon office.

**THE International Entry Systems** Designer, a micro-based data entry system that can be expanded into a stand-alone computer, has now been introduced into the UK by its new exclusive distributor, Office Services of Swindon.

Based on the Zilog Z80, with 16K bytes of memory, the £2,700 system comes complete with full qwerty keyboard, numeric keypad, 40 character alphanumeric

display, 80 column printer and an ECMA/ASCII cassette recorder. An RS 232C interface allows system expansion to produce a stand-alone machine.

Though an extended Basic is available, the main programming language is Quick. This is a prompt-oriented package that has been specifically designed for compilation of conventional programs. It can also be used in forms generation.

## 8086 'based on simple CPU' with control chips

MORE details are being released of the series of new peripheral chips related to Intel's 16-bit 8088 and 8089. Together with the 8088 and 8089, the company has a new bus controller known as the 8222.

The 8086 has been criticised for being "too simple" compared with upcoming competitors from Motorola and Zilog, but now Intel's strategy is becoming clearer.

It has opted for a fast, relatively simple central processing unit, produced in advance of other manufacturers, and surrounded it with a range of intelligent peripheral control chips, which it claims, gives it a real throughput in excess of any other 16-bit micro.

Only sketchy details are available for the 8222, which is specified as a bus arbitration device, linking any other peripheral control chip to the Intel Multibus.

This minimises CPU usage in a manner similar to the IBM 370 channel controller.

As more and more "intelligence" is linked to one central

bus, the 8222 controls the task of allocating access to the bus. For example, when two devices require a bus access at exactly the same time.

The 8089 is a high speed intelligent peripheral processor with fast DMA capabilities, suitable for its own memory buffers. Typically, the 8222 acts as a disc controller.

All the initialisation routines for the disc would be done by the 8089 rather than the CPU, as well as managing local time-consuming details of local positioning, track and sector control. The role of the CPU would be limited to high-level commands that would take less clock cycles.

The third related chip, the 8088, should be the most powerful 16-bit micro yet. Essentially an 8-bit version of the 8086, it features 20-bit (1 Megabyte) addressing and has the full 8086 instruction set. This 40-pin device, produced initially in a 1.5  $\mu\text{m}$  version, will be available on cards which plug into Intel's Multibus system.

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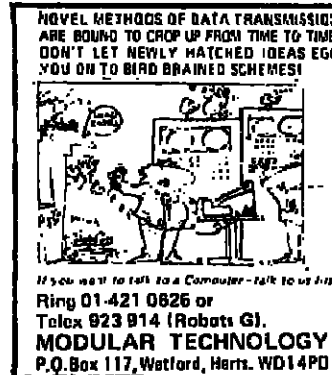
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## INTERNATIONAL BRIEFING

### Hungary offers a new mini

HUNGARY'S Videoton, responsible for the minicomputers in the Rjad unified line of Comcon computers, has introduced a new model of its basic mini, which is based on SEMS Mitra minicomputer licences. The new model, known as the ES-1011 or R-11, is a bit-slice microprocessor reimplementation of the basic mini, and some 50 have already been built.

Videoton exported 77 of its minis to SEMS last year. Exports of computers and computer equipment to the West totalled \$4 million in the second half of 1978.

## CII-HB gains ground over IBM

ALTHOUGH IBM France is still smarting over the fact that it is effectively shut off from the French public sector market (see page 19), the national company CII-Honeywell Bull is hungry for more business at the expense of IBM.

The objective of matching IBM in terms of value of machines delivered each year by 1980 is certainly the most difficult of the objectives we set ourselves at the formation of CII-HB," says the company's president, Jean-Pierre Brulé.

In an interview with the French paper *l'Informaticque*, he points out that the French public sector, nominally a happy hunting ground for CII-HB, is not a monolithic entity.

"There is not one public sector decision maker but many," he says. "Taking for example the City of Marseilles, which is not one of our customers (and is in fact an IBM user), it too is part of the public sector in the terms of our agreement with the government — but the decision is taken by the mayor himself, not by the State."

CII-HB met about 40% of the public sector computer requirements over the period of the four-year agreement established at the time of its foundation.

"Last year, we gained ground over IBM. We are holding our own in the commercial sector, but IBM has not done badly either, and I am not sure that we made up much ground on them, and I certainly don't think we have done enough to beat them in 1980." However, unlike commitments towards shareholders and employees, which he regards as obligatory, the "Beat IBM by 1980" is more of a challenge to the company as a whole.

In the interview, M. Brulé reveals that, like ICL, CII-HB's expenditure on research and development is well above the industry average of 7%, and would amount to about 10% of turnover in 1979. In 1978 it was about 450 million francs, £33 million.

He also reveals that the massively successful Level 6 minicomputer is a big hit in CII-HB territory, with orders running at 10% of the total taken by the company, valued at 300 million francs, £35 million.



Brulé

## October show to avoid clash with Sicob

THE anticipated clash of dates between Sicob in Paris and Systems '79 in Munich will take place this year (CW, September 14, 1978), but in a belated appreciation of the problems caused to computer professionals and exhibitors alike, the organisers of Systems have decided to restore the biennial event to October in 1981.

Nothing can be done about the clash this year: Sicob will take place as usual in the third and fourth weeks of September, running from 17 to 27. Systems will run from September 17 to 21.

This means that not only will the two shows be running at the same time, but that Systems clashes with the "professional" days which open the Sicob exhibition. As a result almost all those who normally attend both shows are likely to decide to go to Sicob as usual and give Systems a miss.

Perhaps worst hit by the clash are US minicomputer and peripherals companies which run lean operations in Europe and traditionally bring over top US company officers for the major European shows. Their limited resources will make it difficult to stage an effective display at both events, and they too are likely to decide to forsake Systems for the much larger and more international Paris show.

Computer professionals who attend the conferences will also have to choose between the French Convention Informaticque and the congress held in conjunction with Systems.

## Transplants index

THE Common Market Commission is considering setting up a Europe-wide index for transplants of human organs. This would enable surgeons to find quickly the most suitable recipients for organs that become available.

The head of the Commission's DP office, Dr Suresh Bli, has carried out a study of suitable information retrieval systems and has recommended that files on kidney transplant patients throughout the nine EEC countries be linked up.

# EFTS goes on trial in France

EUROPE'S first significant experiment with an electronic funds transfer system is under way in the small French town of Bourg-en-Bresse in the French Alps near the Swiss border. The experiment is being conducted by the Banque Regionale de L'Ain. AIn being the Department of which Bourg-en-Bresse is the county town.

At present, 54 merchants are taking part in the pilot trial, ranging from supermarkets and boutiques to petrol stations.

Called MOA, for Multi Operatrice Automatique, the system is implemented by 13 automatic teller terminals installed at strategic locations throughout the town which enable all the usual withdrawal, deposit, transfer and account balance checks to be carried out.

These automatic cash dispensers are IBM 3614s, similar to those currently being installed by Lloyds Bank in the UK.

The revolutionary part of the French EFTS experiment is, however, the installation of IBM 3608 direct debit point-of-sale terminals in shops and stores throughout the town. These accept the same magnetic stripe cards as the 3614s, and enable customers to have their accounts debited directly with the correct sum at the time of purchase.

As with the cash dispensers, the magnetically encoded information on the card is read by the 3608, and the customer then keys in his personal number on a numeric keypad as a verification that he is the authorised holder of the card. The computer then checks his account balance and if it is adequately in credit, completes the transaction, simultaneously debiting the customer's account and crediting that of the store.

## Successor to Iris

FIRST fruits of the CII-HB P7G project to produce a successor mainframe line for both the Honeywell-Bull Level 64 and the CII Iris lines are due for announcement before the end of the year. The top machine in the line will offer twice the power of an Iris 80, which implies that it will approach the performance of the IBM 3032.

## Personal records open for inspection

VOLUNTARY compliance with privacy codes of practice has begun in the US with the announcement by Aetna Life & Casualty Insurance, that without legal compulsion, it would allow individuals to examine and correct their personal records, and that explanations would be given to those turned down for insurance.

## Graphics processing systems from Hitachi

TWO graphics processing systems have been introduced by Hitachi in Japan. The Hitac G-710 is a microcomputer-driven graphic terminal system for computer aided design, and the Hitac G-730, pictured here, is a distributed computer graphic system.

The G-730 includes a minicomputer programmed in Fortran and in POET. Procedure Oriented Element Translator, which is an interactive graphic processing language based on Fortran.

Both systems are designed for use by non-specialists, and among the user aids are menu selection of commands, and symbolic commands based on a graphic tablet.

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## End of govt contract review board

THE Renegotiation Board, a US government agency that reviews contracts between private business and certain government buyers, is expected to close its doors at the end of the month after 28 years of service. One force said to be behind the demolition of the small but powerful agency is the pressure from groups representing government contractors. A last-minute Congressional effort could give the board a temporary stay of execution.

Recently the board ordered IBM to pay \$42 million in excess profits back to the government. IBM has disputed this assessment, and is to go to court to fight the ruling. The action is based on an examination of IBM's computer leases in 1969 and 1970.

Other firms were assessed \$31 million this year, which included penalties for contracts involving computers. These actions, and others in the past, have angered opponents of the board, and it is believed that these companies, through lobbying organisations, played a role in its demise.

Government sources indicate that some of the strongest lobbying against the Renegotiation Board came from the Electronics Industry Association, the Machine and Allied Products Institute and representatives of aerospace companies.

## AMERICAN SCENE

BY HESH WIENER AND CAMERON DAVIS

# Earnings rise, but the market falls

CONFUSION over oil supplies, relations with China, inflation, recession and American politics has left stock analysts in an untenable position.

A computer stock expert says, "One school of thought has the market really dropping. Another has it rising rapidly in anticipation of improved corporate earnings. In other words, nobody seems to know what's going on."

The circumstances are indeed puzzling. Computer companies and the majority of America's large corporations are experiencing an extremely profitable period. Corporate earnings, which jumped upward during the last quarter of 1978, are expected to remain high through the first quarter of 1979 and, for many companies, through mid-year.

Computer stocks have been sold lately, even IBM, which bobbed below 300 during mid-February, despite an impending stock split, the announcement of several attractive products and the expectation that the company would not be greatly affected by any recession that might occur.

Other computer companies have also lost value, in part because of the general Wall Street attitude and in part because of the challenge posed by IBM's 4300 and 8100 computers.

There is no question that the market positions of computer companies will depend on their responses to IBM's price/performance improvements. While IBM's competitors are resourceful, and have always responded to the giant's past challenges, there have been moments of doubt among otherwise confident companies. The sale of RCA's computer business and that of General Electric are brought to mind.

Also in doubt is the state of various leasing companies prominent among them. Intel, Comdisco and Transamerica. These companies may be forced to write down the value of IBM systems now out on lease by a substantial margin, thus decreasing, on paper at least, their wealth and stability.

The effect of the reduction in values of mid-size IBM main-

frames on users' balance sheets is not yet known. For many companies it is a prominent figure in accounts. If the computers become worthless, or nearly worthless, the result could be similar to that of a fire or other disaster.

There may be 5,000 IBM 148 and smaller computers installed in the US. The paper value of a typical system might \$100,000. Thus, with the announcement of the 4300 machines, \$500 million on the books of American business is jeopardised.

The impact of the 4300 on users' accounting will be revealed in coming weeks, as will the effects of the obsolescence of smaller IBM mainframes on leasing companies.

For investors who expect to hold their computer stocks for some time, political uncertainties abroad are much less important.

## More revelations on illicit phone-tapping

TAP, the underground society of phone phreaks, is about to publish a method that is believed to open supposedly secret telephone circuits to unauthorised parties. The forthcoming report, due to appear in the TAP newsletter under the byline of Napoleon Solo, describes a circuit protection technique called "guard banding" that has been used to prevent vandals with blue boxes and other illicit gear from controlling inter-city phone lines.

According to Solo, switching computers that control trunk lines, called tandems, accept a 2,800 Hz signal only when that signal is mixed with noise of another frequency. The 2,800 Hz signal is used to indicate that an inter-city trunk line is not in use. That same frequency is used by phone phreaks to trick telephone company apparatus into relinquishing control of long-distance lines.

The guard banding technique is used to prevent accidental or unauthorised triggering of tandems by music or the illegal devices built by phone phreaks. To shield the tandems from being tricked by an unauthorised 2,800 Hz tone, some switching computers require the tone to be mixed with another frequency.

The phone phreaks say that a 3,200 Hz signal, mixed with the

2,800 Hz tone, will open otherwise secure circuits to the outside world.

Once the guard band is simulated, phone phreaks can access autodialling circuits. These circuits, which require special dialling codes sent to a tandem, permit silent tapping of inter-city phone calls.

AT&T says the circuits are used by authorised telephone company personnel to break into calls during emergencies to test lines. AT&T adds that the claims of the phone phreaks are false or exaggerated.

Proof that guard banding works is said to be found in many reports that phone phreaks have "stacked tandems". Stacking of tandems is a procedure that phone phreaks use to link one tandem to another and thus weave a web of temporarily purloined telephone circuits across the country around the world.

The guard band technique is also used on Autovon, the telephone network used by the US military. Access to Autovon by phone phreaks has been previously reported, and a Vietnam war by phone phreaks to put soldiers in touch with friends and families, free of charge.

## EXPENSIVE AND LENGTHY PROCESS FOR WESTERN SUPPLIER

# Breaking into the Russian market

By Michael Aldrich of Redifon Computers

WESTERN computer manufacturers have long cast envious eyes on the Russian computer market. By Western standards, the Soviet Union is heavily under-computerised both in numbers of systems and range of applications, but although the country is committed to large expenditures on computing, there is no potential bonanza for Western suppliers.

The use of computers in Russia is tied to a plan that recognises their role in making government, industry and services more efficient. That plan is bound into the growth of the Russian computer industry and those of allied economies in Eastern Europe.

Through the Rjzd plan for a unified range of East European computers and peripherals, the USSR has access to most of the computing power it needs in terms of mainframes but less so in terms of minicomputers.

For the Western supplier, except in unusual circumstances, there is no market for mainframes. Minicomputers are being bought for specific applications, but as local supplies increase, they will follow the path of the mainframes.

Because the USSR never embarked upon the widespread use of mainframes as in the West, the use of multiple mini and microcomputers instead of mainframes receives sympathetic attention. Easy to use systems with Cyrillic software, keyboards and printers are being installed to replace manual systems.

Just as in the West, technical computer skills are scarce commodities, and thus the attractions of simple terminal-driven systems with fast delivery and quick implementation are substantial.

In theory there is a market for large scale scientific mainframes of the kind produced by Control Data, but such sales are so beset by political considerations, restrictions and the need for approvals that in practice it is difficult to complete a sale.

Probably the best marketing opportunity lies with microcomputers. At the Informtechnika exhibition in Moscow last month, mainframes were conspicuous by their absence, minicomputers were shown for particular applications, but microprocessors were in abundance.

Of the major suppliers at the exhibition, IBM gave pride of place to a laser printer, CII-HB had a graph-plotting Level 61160, Burroughs displayed a word processing equipment, and Redifon, the only UK computer manufacturer present, had two large working R850 DDP configurations with telecommunications networks. The largest stand was that set up by Wang.

The novel aspect of the exhibition, however, was the presence of the major distributors of personal computers. With their long history of innovative use of other equipment designed for other purposes, the Soviet Union could well be attracted to the development of personal computers for business application use. The low cost and high technology transfer benefits must be attractive.

Market entry in the USSR is expensive and lengthy for the

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For the Olympics, the best trade environment with the Soviet Union will be dominated by the 1980 Olympics to be held

Western supplier. The best way in is probably to exhibit at the many exhibitions organised by the Expo Centre in Moscow. The exhibitions are well attended by the whole spectrum of foreign trade organisations and end-users from all parts of the USSR.

All commercial transactions are completed through the appropriate foreign trade organisations, the government-run import/export agencies staffed by technical and commercial specialists. These people are highly professional in their operations and formidable in their negotiating expertise. As a result, contractual negotiations are detailed and exhaustive.

The Soviet Union expects performance, is prepared to pay for it and it will not tolerate mediocrity. Business dealings are scrupulously fair and payment is made on time.

The overall business climate in Russia is conservative. It takes time to become accepted as a supplier. Computer acquisitions are often planned years ahead so the individual system buying cycle is slow. When confidence is established, business becomes predictable provided that the supplier continues to perform.

In evaluating suppliers the Soviet Union is careful and methodical. Its starting point is the same criteria used by computer buyers everywhere — company stability, ability to solve problems, growth potential and future possibilities, terms and conditions etc.

Its follow-on position is more inscrutable: the qualitative issues of local staff and organisation, commitment to the Soviet market, spares support, all levels of education and training, literature, reference manuals, and finally sheer stamina to satisfy demanding and discerning customers.

Foreign currency is available only for important projects which inevitably are monitored closely from pre-contract to post-installation. Complete success is the major criterion. Thus the Soviet Union looks for across-the-board back-up services and organisation from the supplier.

In practice, Soviet customers adopt a policy of self-reliance, which is more in line with the national character. Users are not over-demanding of support services. In fact, they are easy to deal with and generally make excellent references.

Above all, they are more creative and innovative in their use of systems than equivalent Western organisations.

In marketing computer systems in the Soviet Union it must be remembered that Soviet policy is to develop self-sufficiency. Education and industrial strategy are geared to this end. The Soviet Union does have, however, a continuing need in different areas for Western technology. This need will remain as long as the technology gap exists.

In the future, manufacturing licences may increase and be-

come more valuable than selling finished goods. Available hard currency is better utilised building local industry than financing imports — a lesson that the British government could usefully learn.

Licences, however, sometimes have the unfortunate effect of blowing back on the licensor,

when the licensee decides to export to markets previously supplied by the licensor. For this reason licences are becoming more restrictive in their marketing rights.

For the next 12 months, the trade environment with the Soviet Union will be dominated by the 1980 Olympics to be held

in Moscow. The Games have captured the popular imagination and the authorities are determined that the XXIII Olympiad will be long remembered.

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## 74 laws on information

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"The new technology gives us the opportunity to make better use of information to improve the quality of life and the quality of government," Rose remarks.

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"In discussions I found, much to my surprise, that there is no acceptance of application software," he said. Up to now he noted, the Japanese had had their application software custom written, but now the

## Xerox aims to take over international telecoms firm

PLANS for a domestic data communications network, called XTEN, are still being pushed forward by Xerox, and the company is now aiming to get control of an international record carrier as well, WUI Inc (CW, February 1).

WUI operates international telex, voice and data channels, cablegrams, data communications and satellite services. WUI also owns Airsignal International, a radio common carrier.

The board of directors of WUI has already approved the proposed acquisition by Xerox, a deal that would be completed via a stock transaction estimated to be worth more than \$200 million.

Last month Xerox and WUI filed a joint application with the Federal Communications Commission for approval of the proposed pact. Such approval is necessary because WUI is operating company, Western Union International, and Airsignal International both hold FCC licences.

The takeover is also dependent on financial agreement and stockholder approval. In the meantime, WUI has indicated it will oppose any moves by Continental Telephone Co, which has bought 13% of outstanding WUI stock, to gain a controlling interest.

Fujitsu and Hitachi were entering the low end of the mainframe market, which embraced first time users, they realised that they had to have application packages to sell their machines.

"As a result, MITI is to finance the development of packages (CW, September, 14, 1978). With government support, Japanese productivity and the launch of small computers, they should begin to market in the US within three years.

Through acquisitions, reciprocal agreements and joint ventures, the time-span could be even shorter. There is no reason for them not to be successful in the production of effective software products and their competition will certainly benefit the

Systems. Meanwhile, the FCC is studying another proposed acquisition, that of GTE hoped-for takeover of Teletel Communications Corp. valued at over \$50 million, the GTE Teletel proposal is being examined by the FCC as a potential monopoly in the telecommunications business in general, and the packet switching market in particular.

Amid rumours that regulatory delays might jeopardise the deal, the commission has promised "expedited" proceedings. GTE has told the FCC that the Teletel deal must be completed by May 21.

Now, in addition to considering SDS, ACS and XTEN, the FCC is faced with two major acquisition proposals.

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## End of govt contract review board

THE Renegotiation Board, a US government agency that reviews contracts between private business and certain government buyers, is expected to close its doors at the end of the month after 28 years of service. One force said to be behind the demolition of the small but powerful agency is the pressure from groups representing government contractors. A last-minute Congressional effort could give the board a temporary stay of execution.

Recently the board ordered IBM to pay \$42 million in excess profits back to the government. IBM has disputed this assessment, and is to go to court to fight the ruling. The action is based on an examination of IBM's computer leases in 1969 and 1970.

Other firms were assessed \$31 million this year, which included penalties for contracts involving 25 companies.

These actions, and others in the past, have angered opponents of the board, and it is believed that these companies, through lobbying organisations, played a role in its demise.

Government sources indicate that some of the strongest lobbying against the Renegotiation Board came from the Electronics Industry Association, the Machine and Allied Products Institute and representatives of the aerospace companies.

## AMERICAN SCENE

BY HESH WIENER AND CAMERON DAVIS

# Earnings rise, but the market falls

CONFUSION over oil supplies, relations with China, inflation, recession and American politics has left stock analysts in an untenable position.

A computer stock expert says, "One school of thought has the market really dropping. Another has it rising rapidly in anticipation of improved corporate earnings. In other words, nobody seems to know what's going on."

The circumstances are indeed puzzling. Computer companies and the majority of America's large corporations are experiencing an extremely profitable period. Corporate earnings, which jumped upward during the last quarter of 1978, are expected to remain high through the first quarter of 1979 and, for many companies, through mid-year.

Computer stocks have been sold lately, even IBM, which bobbed below 300 during mid-February, despite an impending stock split, the announcement of several attractive products and the expectation that the company would not be greatly affected by any recession that might occur.

Other computer companies have also lost value, in part because of the general Wall Street attitude and in part because of the challenge posed by IBM's 4300 and 8100 computers.

There is no question that the market positions of computer companies will depend on their responses to IBM's price/performance improvements. While IBM's competitors are resourceful, and have always responded to the giant's past challenges, there have been moments of doubt among otherwise confident companies. The sale of RCA's computer business and that of General Electric are brought to mind.

Also in doubt is the state of various leasing companies, prominent among them Ite, Comdisco and Transamerica. These companies may be forced to write down the value of IBM systems now out on lease by a substantial margin, thus decreasing, on paper at least, their wealth and stability.

The effect of the reduction in values of mid-size IBM main-

frames on users' balance sheets is not yet known. For many companies it is a prominent figure in accounts. If the computers become worthless, or nearly worthless, the result could be similar to that of a fire or other disaster.

There may be 5,000 IBM 148 and smaller computers installed in the US. The paper value of a typical system might \$100,000. Thus, with the announcement of the 4300 machines, \$500 million on the books of American business is jeopardised.

The impact of the 4300 on users' accounting will be revealed in coming weeks, as will the effects of the obsolescence of smaller IBM mainframes on leasing companies.

For investors who expect to hold their computer stocks for some time, political uncertainties abroad are much less important.

## More revelations on illicit phone-tapping

TAP, the underground society of phone phreaks, is about to publish a method that is believed to open supposedly secret telephone circuits to unauthorised parties. The forthcoming report, due to appear in the TAP newsletter under the byline of Napoleon Solo, describes a circuit protection technique called "guard banding" that has been used to prevent vandals with blue boxes and other illicit gear from controlling inter-city phone lines.

According to Solo, switching computers that control trunk lines, called tandems, accept a 2,600 Hz signal only when that signal is mixed with noise of another frequency. The 2,600 Hz signal is used to indicate that an inter-city trunk line is not in use.

That same frequency is used by phone phreaks to trick telephone company apparatus into relinquishing control of long-distance lines.

The guard banding technique is used to prevent accidental or unauthorised triggering of tandems by music or the illegal devices built by phone phreaks. To shield the tandems from being tricked by an unauthorised 2,600 Hz tone, some switching computers require the tone to be mixed with another frequency.

The phone phreaks say that a 3,200 Hz signal, mixed with the

2,600 Hz tone, will open otherwise secure circuits to the outside world.

Once the guard band is isolated, phone phreaks can access autoverify circuits. These circuits, which require special dialling codes sent to a tandem, permit silent tapping of long-distance phone calls.

AT&T says the circuits used by authorised telephone company personnel to break into calls during emergencies are not to be used to test lines. AT&T adds that the claims of the phone phreaks are false or exaggerated.

Proof that guard banding works is said to be found in many reports that phone phreaks have "broke us down". Stacking of tandem circuits that phone phreaks use to link one tandem to another and thus weave a web of temporarily pulsed telephone circuits across the country is around the world.

The guard band technique is also used on Autovon, the telephone network used by the US military. Access to Autovon by phone phreaks has been previously reported, and misuse was reportedly used during the Vietnam war by phone phreaks to put soldiers in touch with friends and families, free of charge.

## EXPENSIVE AND LENGTHY PROCESS FOR WESTERN SUPPLIER

# Breaking into the Russian market

By Michael Aldrich of Redifon Computers

WESTERN computer manufacturers have long cast envious eyes on the Russian computer market. By Western standards, the Soviet Union is heavily under-computerised both in numbers of systems and range of applications, but although the country is committed to large expenditures on computing, there is no potential bonanza for Western suppliers.

The use of computers in Russia is tied to a plan that recognises their role in making government, industry and services more efficient. That plan is bound into the growth of the Russian computer industry and those of allied economies in Eastern Europe.

Through the Rjail plan for a unified range of East European computers and peripherals, the USSR has access to most of the computing power it needs in terms of mainframes but less so in terms of minicomputers.

For the Western supplier, except in unusual circumstances, there is no market for mainframes. Minicomputers are being bought for specific applications, but as local supplies increase, they will follow the path of the mainframes.

Because the USSR never embarked upon the widespread use of mainframes as in the West, the use of multiple mini and microcomputers instead of mainframes receives sympathetic attention. Easy to use systems with Cyrillic software, keyboards and printers are being installed to replace manual systems.

Just as in the West, technical computer skills are scarce commodities, and thus the attractions of simple terminal-driven systems with fast delivery and quick implementation are substantial.

In theory there is a market for large scale scientific mainframes of the kind produced by Control Data, but such sales are so beset by political considerations, restrictions and the need for approval that in practice it is difficult to complete a sale.

Probably the best marketing opportunity lies with microcomputers. At the Informtechnika exhibition in Moscow last month, mainframes were conspicuous by their absence, but microcomputers were in abundance.

Of the major suppliers at the exhibition, IBM gave pride of place to a laser printer, CII-HB had a graph-plotting Level 61/60, Burroughs displayed a 680 and word processing equipment, and Redifon, the only UK computer manufacturer present, had two large working R850 DDP configurations with telecommunications networks. The largest stand was that set up by Wang.

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For the Olympics, the best equipment available on world markets is being acquired. The Soviet Union is demonstrating



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## Japanese package threat

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# US govt settles on interface standard

DESPITE fierce opposition from most of the US mainframe manufacturers, the US government has adopted as its required computer input-output interface a standard which is essentially based on the IBM 380

## Japanese dispute pricing of 4300

THE hold-up in the announcement of the IBM 4300 line in Japan (CW, February 22) resulted from disagreement between IBM and the Japanese Ministry of International Trade and Industry over pricing of the machines. IBM set a Japanese price somewhere between 1.2 and 1.8 times the US dollar price in the US, and Japanese sources believe that IBM wants to price the 4300s at the low end of the price multiplier while MITI wants the machines priced at the high end to minimise the impact on domestic Japanese manufacturers.

# Last chance to take up the big challenge

NEARLY 200 teams have entered for the Computastars 79 competition, with entries spread well over the country. However, the response from Wales and Scotland has been low, so more challengers are needed from North of the Border and from the Principality and the South-West to ensure heats can be held in those areas. This is the last chance to enter the country's biggest athletic contest for computer people. Complete the form below and send it with the entry fee to Computastars, 117b High Street, Croydon, Surrey. Cheques should be made payable to Computastars.

The contest is jointly sponsored by Wright Air Conditioning and Computer Weekly.

**ENTRY FORM**

We have read and accept the conditions of entry for the Computastars 79 competition and would like to enter . . . men's teams . . . women's teams.

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Name of unit . . . . .

Number of staff in unit . . . . .

Address . . . . .

Name of contact for team (s) . . . . .

Telephone number . . . . . Extension . . . . .

Signature of manager in charge of unit . . . . .

Position held . . . . .

Enclosed is £ . . . . . to cover the entry fees for . . . . . men's and/or . . . . . women's teams. Cheques should be made payable to Computastars.

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Please circle appropriate centre.

In all matters relating to the rules and the competition, the decision of the organiser is final. Please send this entry form to: Computastars, 117b High Street, Croydon, Surrey. Tel: 01-888 6680.



Amdahl systems under test in Dublin (see below).

## Amdahl's Irish assembly plant gets off to encouraging start

THERE are currently five machines on test at Amdahl's assembly plant in Dublin, shown above, and the company is planning to build 30 of its 470V series mainframes there this year. At present the V/8 models are being built, but V/7s and V/8s will follow in June. Since production began last summer 12 machines have been shipped from the plant, which builds only for the European market and will meet full European demand for some time. Amdahl currently has 28 installations in Europe: six in the UK, six in Italy, four in West Germany, where the company first opened, three in France, three in Norway, and two each in Switzerland and Denmark.

It is noteworthy that despite setting up first in West Germany, Amdahl has not been spectacularly successful there, with only one commercial customer, which suggests that Siemens may have difficulty in persuading many German IBM users to switch to Fujitsu's M-series, renamed for local consumption the 7.800 line. However, Siemens' primary target is understood to be its own users who are outgrowing the 7.700 line.

The Dublin plant, with 92 employees and only one departure so far, plans to be employing over 200 by the end of the year, and over 400 once its new 90,000 square foot plant under construction at Swords, County Dublin, is completed.

Much of the work in Dublin is still final assembly and test, but the consoles, incorporating a Keronix minicomputer and fixed disc, and the power frame assembly are now manufactured.

Even at Sunnyvale, Amdahl still puts together machines including some modules made in Japan by Fujitsu, and some machines are still built almost entirely by Fujitsu; in total, Fujitsu estimates that it still does 50% of Amdahl manufacture. At present all Japanese assemblies come to Ireland via Sunnyvale, but in the future

they will come direct. Takara still continuing with Thomas about incorporating Thomas' memories in the Irish machines, which would have cut the duty on Irish-built machines shipped within EEC, but no agreement has been reached.

Amdahl reports that rates are much lower than boards assembled in Dublin at Sunnyvale, and Harry L. Lior, who heads the Irish operation, is enthusiastic about Irish workforce.

"The labour force is excellent and they have been retrained," he says. "Workers are more willing here than in Sunnyvale, where they can always get another job across the road. Labour costs are also lower, but at this stage, so is productivity."

"The major shortage is of highly trained systems test people; we need people with five to 10 years' experience on IBM equipment, and at present, they are all coming from the UK. We are training graduates here, but it will take time. Industrial Development Authority training grants are vital for this."

According to Mueller, the highest problems so far have related to public utilities. "Electricity, post office and transport strikes have caused us difficulties," he says.

## Office automation aimed at professional staff, says report

THE thrust in new office automation products will be towards the use of terminals by professional staff as well as by secretaries and clerks, and towards distributed micro-based systems combining word processing and data processing.

These are the main findings of a report which New York stock analysts Frost and Sullivan have added to the current information explosion of studies on word processing.

# Networks can be a crucial weapon in the armoury . . . . .

By Anthony Gunton

THE position of data communications networks can be likened to the position of file management systems before the advent of database techniques. Databases add to the basic ability to access, process and manage data. Similarly, the currently favoured network architectures promise to add, to the ability to transport data, the opportunity to manage both the network and the data which it transports.

If you like, the data communications network is becoming an information handling tool rather than purely a transport service. However, databases are not for everyone; nor will these intelligent networks suit everyone. They will not be cheap, but those who implement them will not do so because they save money, which they often will not, but more probably because they make possible a better level of service to users.

Let us begin with a definition. Typically, in an organisation there will be a large number of users of information or of services. They may have terminal devices or small stand-alone computers. Then there will be shared facilities, often one or more

reason response systems. The reason why all these devices should share the same network is, quite simply, that the cost and inconvenience of establishing separate networks for each will be prohibitive, particularly when all of them produce digitally encoded information.

Considerable interest has been generated in networking over the past few years, particularly by the success of Arpanet and of the value-added networks it spawned such as Graphnet and Telenet.

However, it must be said that success has so far been measured in technical rather than commercial terms. Packet switching, on which most of these intelligent networks are based, is still an expensive technology.

It is now on the verge of demonstrating its commercial viability in the public domain and, possibly, in the private domain also. British Stoddard experience with its internal network will no doubt be watched with great interest.

In fact what these packet switching networks do is nothing new. The airlines' Sita network, for example, has many of the features commonly associated with packet-switching networks. So do the time sharing networks such as Tymshare's Tymnet and GE's Mark III.

What is significant is that the features of these application-specific networks have been incorporated into a general purpose scheme of great versatility. This versatility derives, to a large extent, from the multi-layered structure which has been adopted also in the network architectures of the computer manufacturers.

It is this that makes them complex in comparison with the previous generation of networks, using protocols such as IBM's BSC and ICL's XBM, and also what gives them their power and their ability to cope with today's systems, where an increasing variety of devices communicate in a more complex fashion.

One can reasonably assume that any management services manager would wish to have such a tool at his disposal. What then are the issues which need to be resolved before an intelligent network will be a practical proposition for all, not just the pioneers?

Firstly, the enterprise and the attitudes of the PTT, reflected in tariff and regulatory policy, will have a profound impact. This is too large a subject to do more than touch on here. Suffice it to say that PTTs have the power to determine the pace that modern networking techniques are taken up and also to determine who can participate — whether it is only the large organisations who can build their own network or everyone with a network problem.

No less important are the other established suppliers of data communications products, the computer manufacturers. Their network architectures promise the user a new level of capabilities. Will this be realised, or will we see another round of defensive in-fighting, in which each supplier's main objective seems to be to lock his users in, rather than to solve system problems? It is clear that many suppliers

## REPORTS FROM THE FOUNDATION-3

This Computer Weekly series is based on reports made by the Butler Cox Foundation research group, which examines a variety of topics relating to the development and use of information technology. Anthony Gunton is a partner in Butler Cox and Partners and heads the information and research unit. He is the author of the Butler Cox Foundation reports on Developments in Data Networks, Terminal Compatibility and Public Data Services.



The Foundation is a research group which examines major developments in its field — computers, telecommunications and office automation — on behalf of subscribing members. The Foundation transmits its findings to members in three principal ways: as regular written reports, through management conferences and through professional and technical seminars.

Perhaps the most important of these will be the ability to spend more time on user problems and less on purely technical difficulties of logistics, compatibility and so on. For the management services department, the network can be a crucial weapon in the armoury, in a battle which is being waged on a fast-widening front.

But our researches show that those who have invested in DBMs are obtaining returns, and we believe that the same will become true of networks. Undoubtedly, there will be a long learning process, as there has been with database, but for those who persevere the rewards will come.

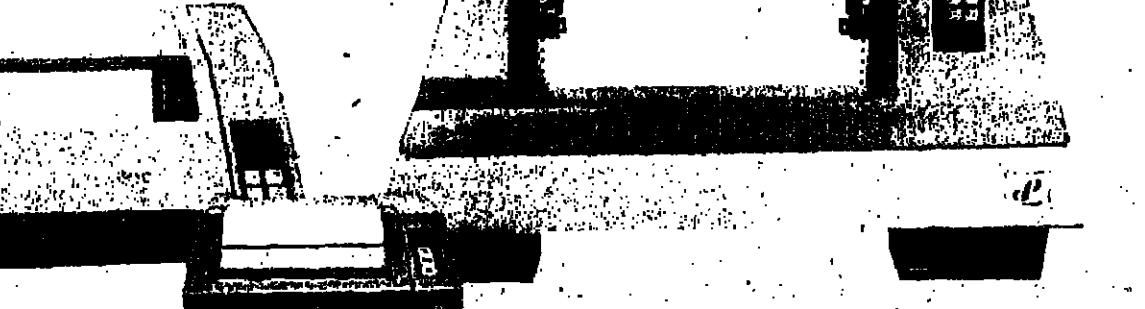
market, but is a prerequisite if skilled resources, already in short supply, are to make anything of the opportunities which technology opens up.

If networks are to achieve the medium of widely-recognised standards! These standards must be both comprehensive enough to encompass the variety of tasks which the network will be required to perform, and also precise and durable enough to remain effective. The alternative is the rather haphazard de facto standards which will develop in a free market, both the comprehensiveness and the effectiveness of which would be open to doubt.

Intelligent networks, public or private, will not take the hard work out of information processing, just as database management systems have not taken

## DATAPRODUCTS NEW ERA PRINTERS

a Matrix - a Thermal and two Band printers.



### M-200 200 lines per minute

The M-200 is the first member of Dataproducts' matrix printer family. It is a new printer with an average speed of 200 LPM (at 80 characters per line) which combines the low cost and flexible operation of a matrix printer with the most desirable features of a line printer.

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One other ingredient, which might be added to IBM's definition, is that of diversity. While the network structure itself must be unified and coherent, the devices attached may be diverse and often are, in one way or another, incompatible with one another. This incompatibility is the inevitable result of a competitive market and a rapid rate of technological advance, avoided only by those prepared to buy all their equipment from a single supplier.

We can expect the devices connected to the network to include not only screen and keyboard terminals, remote batch terminals, general purpose and minicomputers, which now constitute the majority of the population. Increasingly there will also be devices which handle text — such as communicating word processors — or images, like facsimile transmitters, and even

### B-300 & B-600 300/600 lines per minute

The B-Series is the first band printer family from Dataproducts. This new series with present speeds of 300 LPM and 600 LPM offers a unique combination of new technologies and field-proven reliability, from the friction-free Mark V hammer actuators to the simplicity of the mechanics and micro-processor based electronics which provide an exclusive diagnostics display to maximise up-time and minimise unnecessary service calls.

The T-80 is the first in a series of thermal matrix printers from Dataproducts. It uses a non-impact, single thermal dot matrix printing head to offer a print speed of 80 characters per second — for the price of 30.

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## INTERNATIONAL NEWS IN BRIEF

### CDC partner in India

AN OLD Madras-based plantation company, A. V. Thomas, is to be Control Data's partner in marketing computers in India. Although CDC has had a 3600 at the Tata Institute for Fundamental Research in Bombay since 1964 (CW, August 1, 1974) it is one of the last US mainframes to announce a formal link with an Indian company to sell its machines.

### Swiss first

FIRST Swiss order for dual-processor V-8590, currently the largest NCR mainframe available for delivery, has come from the Cantonal Bank of Schwyz, Switzerland. It replaces an NCR century 201 and will support 58 terminals at 21 locations.

### SA subsidiary

MEMOREX is running down its subsidiary in South Africa and its products are to be distributed there by the former subsidiary of Computer Resale Brokers, South African Computer Resale Brokers.

# COMPUTER WEEKLY INTERNATIONAL

## New Robotron mainframe on show at Leipzig

HIGHLIGHT of this year's Leipzig Fair in the German Democratic Republic is the new Robotron ES-1055 mainframe, the largest machine currently available in the Eastern bloc's Rjad unified range.

The fair, which has been running all this week, is the most important showcase for the East German manufacturer's computer products, and Robotron has been taking full advantage of it.

The ES-1055, which has a specification almost identical to that of the IBM 370/148, with two Megabytes maximum main

memory, is nevertheless claimed to be closer to the 370/158.

The company has been demonstrating a railway seat reservation system developed for the Deutsche Reichsbahn and the railways of other Comecon countries, which handles couchette and bed reservations as well as seats.

The operating system on the 1055 is the standard Rjad OS/ES, with enhancements, and the database management system, called DBS/R, is understood to be akin to IBM's Bill of Materials Processor.

The Robotron Daro 1700 line of office computers has been the most successful GDR computer product in Western Europe, and on show are the 1750, with floppy disc backing and magnetic ledger cards, the 1720, with magnetic ledger cards, and the 1711, involving machine.

The 1711 is a micro-based system with 512 bytes of control memory, and 16 words of user memory, controlling an electric typewriter. The K1000 series is a line of micro-computers which use LSI MOS semiconductor processor and memory circuits.



## US index to combat insurance fire frauds

INSURANCE frauds by arson are to be combated in the US with a computer index set up by the American Insurance Institute, the trade association for 90% of US fire insurers.

Data on all fire claims in excess of \$500 will be fed into the system in order to pinpoint property owners who have more than one policy on a building or who keep having fires at different properties.

According to Gerald Murphy, manager of the Property Insurance Loss Register, this should help reduce the estimated \$1 million that arson costs US insurance companies each year. "Arson for profit has reached epidemic proportions," says McDonnell Douglas Inc., awarded a \$1.1 million contract to design and install the system.

## China orders communications equipment

DIGITAL pulse code modulation microwave communications equipment has been ordered from Nippon Electric by China. It will be used in monitoring and controlling hydroelectric power distribution and irrigation, and in flood prevention, in the area between Peking, Shanghai and Wuhan. Up to 450 channels will be provided over a 2,500 km route.

Japan's Ministry of International Trade and Industry is planning to seek special approval for the deal from CoCom, which monitors Western exports to Communist countries.

## PoS increase

DURING 1978 the number of NCR supermarket point-of-sale systems in the US with Universal Product Code scanning increased from 50 to 224.

## £850,000 order from Libya

THE biggest contract for CMC-UK, the Hemel Hempstead-based subsidiary of Microdata of California, has been awarded by Libya's Public Social Security Institute. Worth £850,000, the order is for five Reality Royale small business systems and for five key-to-disc systems.

The Royales, which are built around Microdata minicomputers, will each support six terminals, and all the terminals and keystations will support both Roman and Arabic alphabets.

One Royale and one key-to-disc system will be installed in each of five regional centres, handling registration, contributions and benefits for about three million people.

## Italian firm to produce Zilog Z8000

THE Z8000, 18-bit microprocessor from Zilog is to have a European second source, following an agreement in principle for Italian company SGS.

SGS, already a second source for the Z80 micro, will be supplied with masks, test data and other technical information by Zilog for the production of the Z8000 CPU chip, plus the memory management chip, a FIFO buffer memory, a counter and parallel I/O chip, a serial I/O chip, a buffer unit and a universal peripheral controller.

Also included in the agreement is SGS' rights to second source the single chip Z8 micro-computer. Zilog is due to begin sampling of this part during the second quarter of this year. SGS will not get rights to the peripheral devices being designed by AMD as part of its own second source agreement with Zilog (CW, September 7, 1978), but according to European director Pepe Piedra, SGS will not go short of these components.

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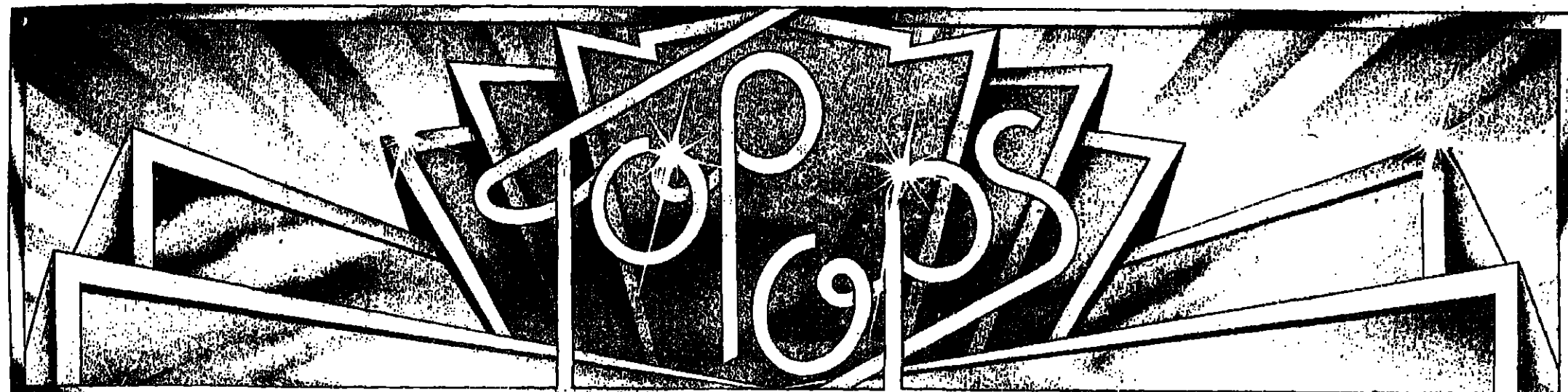
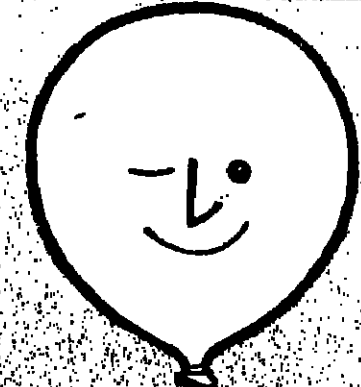
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State-of-the-art software development is a very demanding role. The person appointed will need the ability to guide a team in the development of entirely new techniques, and should be able to offer a sound mini and/or micro background incorporating experience of RSX11M, and communications protocols.

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Additionally, the systems analysts will be responsible for pro-

ducing business proposals, preparing cost and benefits appraisals, estimating project requirements and maintaining installation standards. The more senior persons will lead a team of analysts, reporting on progress whilst controlling the quality of work produced.

The company, based in modern offices on the outskirts of London, offers impressive starting salaries and very attractive career prospects. Employee benefits include generous relocation expenses, pension/life assurance scheme and a staff restaurant.

Ref: S1/1503

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Ref: A3/1503

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# SYSTEMS ANALYSTS AND PROGRAMMERS BEDFORDSHIRE

## Major database applications

We have been retained to recruit additional systems analysts and programmers by a progressive and well-known organisation based in Bedfordshire.

The data processing department is well established and fulfils a central role in providing essential control systems and management information covering all aspects of the

company's operations. The installation is a medium-sized IBM 370 and DL-1 and CICS VS are already in use in key areas of the company.

Major new projects are to be developed making extensive use of database and involving additional teleprocessing including links to remote locations.

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(CW 79013)

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Contact Ivor Norton by telephone or in writing quoting the appropriate reference at your nearest office. Interviews will be arranged at locations throughout the U.K. to suit the convenience of suitable applicants.

## PROGRAMMERS c £6000

These positions should appeal to ambitious young programmers who should have about 3 years COBOL experience. Previous IBM experience is not necessary.  
(CW 79014)

## Ivor Norton Management Services Ltd Recruitment Consulting Division

52 Shaftesbury Avenue, London W1V 7DE. 01 734 8862 (24 hour answering service) P.O. Box 63, Copthall Tower House, Harrogate HG1 1TS. Tel: Harrogate 66628

## JBA

## Systems Analysts (Defence Project)

Munich c.£19,000 nett.  
Our client, seeks experienced Analysts who have been engaged on defence projects for a number of years, preferably involving machines such as the Hughes 5118 and 1116 mini-computers. An in-depth knowledge of JOVIAL is essential.  
The project work will be connected with an avionics air-to-air guided weapons system and a low-level radar detection system intended for a major ground force in Europe.  
Long term assignment, first class salary and great opportunity to enjoy a high living standard.  
Contact: Mike Creamer

## Analyst Programmer

Paris c.£10,000+  
A well established banking and commercial trading company has a vacancy for an Analyst/Programmer to join a development group in Paris who are responsible for commercial systems.  
Applicants must have a minimum of two years as an Analyst/Programmer working on accounting applications. Experience of minicomputers and on-line systems is essential, particularly the HP3000 equipment. Knowledge of French is desirable but not essential as assistance is available for language training.  
Excellent salary and fringe benefits for this opportunity to live and work in Paris.  
Contact: Jim Baker

## Designers - Industrial Systems

Bracknell up to £7,500  
Our client, a small software group in a well established British organisation, have opportunities for Systems Designers to take responsibility for the development of real-time applications.  
Candidates must have a programming background (e.g. ASSEMBLER, CORAL, RTL/2) and several years in the design of special systems using minis or micros. Project leader experience would be an advantage.  
This is an excellent opportunity to work on advanced applications in a small professional environment but with large company benefits which include new offices, relocation assistance, free car parks, etc.  
Contact: Jim Baker

## Technical Authors (Software)

Paris c.£12,000  
Long term contractual positions are available to Technical Authors or documentation oriented Programmers who wish to enjoy living and working in one of the most exciting capitals of Europe.  
The work covers a variety of aspects from user guides to detailed descriptions of software application products and operating systems. Knowledge of communications and/or distributed processing systems is particularly desirable.  
Contact: Mike Creamer

## Systems Consultants

Newman Street, London W1 (based) range £8,000 - £10,000 + L/JICA continue to expand their presence in the commercial systems market (as part of a very diverse £10 mill. business) and is extremely well known for the high level of expertise in problem solving.  
Opportunities now exist for additional consultants who can show a solid all-round d.p. background encompassing both programming and commercial systems experience. Knowledge of COBOL or PL/I and on-line techniques plus involvement with retail/distribution/mail order applications would be of particular interest.  
Hardware background is unimportant - although IBM, or HONEYWELL, is particularly useful. Versatility, flexibility and in-depth d.p. knowledge are the key factors we shall be seeking.  
Contact: Margaret Stevens

## (Micro) Compiler Development

N.W. London £5,000 - £6,500  
This small and highly successful systems house is commencing development of a new compiler, designed exclusively for use on micro-computers in a real-time, on-line environment. The project has room for a junior programmer with 18-24 months mini or micro Assembler programming experience, and who has the personality to be able to liaise with clients and customers.  
The appointee will be joining a team of outstanding talent, which is breaking new ground in the world of micro-based business system and operating software design and which has forged an almost unique place for itself in the software market. An unparalleled career building opportunity.  
Initial salary will be negotiated according to experience.  
Contact: Andy Wright

For further information on any of the above vacancies please contact the appropriate consultant. If your qualifications do not match the above positions but you are seeking other opportunities please contact us anyway.

JAMES BAKER ASSOCIATES, International Personnel Consultants  
16 Maddox Street, London W1. Tel: 01-491 4478

## TEESSIDE POLYTECHNIC Computer Centre

The Computer Centre provides a computing service for the teaching, research and administrative work of the whole Polytechnic. It is equipped with a powerful Univac 1110 machine recently installed which will support over 80 terminals and an extensive range of graphics devices.

A number of additional posts have recently been established. Applicants are now invited for the following posts which offer an opportunity to join a growing team engaged on a number of interesting developments.

## Projects Manager

(Information and User Support) - New Post  
£6000-£6700 (including supplements)

To lead a team of Programmer/Analysts charged with ensuring that good technical support for staff and students using the computing facilities is provided. The team is responsible in particular for all technical documents and user guides, for courses of instruction on the facilities for the programming advisory service and for general liaison with the user community. Good experience of computer applications and a ready interest in helping others is essential. Some knowledge of the techniques of technical writing or of teaching would be an additional recommendation.

## Projects Manager

(Applications Programming) - New Post  
£6000-£6700 (including supplements)

To head a team of Programmer/Analysts responsible for providing and maintaining a wide range of applications software, including statistical and numerical packages and engineering and database software, offering specialist advice on its use and supporting library and administrative computing. Broad experience of computer applications including technical computation is essential.

Candidates for the posts should possess a degree or similar level qualification in a suitable subject.

Application forms and further particulars from The Registrar, Teesside Polytechnic, Borough Road, Middlesbrough, Cleveland, to whom they should be returned within 14 days.

## SOUTH DERBYSHIRE DISTRICT COUNCIL

Do you have at least 2 years' COBOL experience and feel your talents could be better employed by a move into systems analysis? If so, you may be the person we are looking for as:

## PROGRAMMER/ANALYST £3,732-£4,632

The Council is awaiting delivery of the very latest Honeywell Level 62 technology with 320K memory and 3 x 80 mb discs to replace its present 61/60. The successful applicant will be a member of a team engaged initially on conversion to the new installation and thereafter will play an important role in developing new systems.

The Council's offices, which by early summer, will be situated in a new purpose built block, are in Swadlowgate a small town close to the Midlands motorway network and the cities of Derby, Leicester, Nottingham and Birmingham but within easy reach of such scenic attractions as the Peak District.

In addition to a salary within the above range the Council offers an attractive relocation package. For further details and an application form, telephone Mr. A. G. Meekings on Burton-on-Trent (0283) 221000 or write to The Treasurer, Council Offices, Midland Road, Swadlowgate, Burton-on-Trent, DE11 0AH.

Closing date for applications 28th March, 1979.

# CMG & BANKING

## CONSULTANTS/ANALYSTS/PROGRAMMERS

Due to the past successes and growth of the Banking Services division of the City of London subsidiary of CMG, a new Company has recently been formed specifically to concentrate on the data processing requirements of the Banking world.

We shall shortly be moving to new offices in the City and are looking for further qualified staff to share it with. If you want to join an already established, but relatively small group of DP professionals and can offer a solid DP background together with relevant business experience we would like to talk to you.

We plan and expect a substantial growth rate, thereby rapidly producing opportunities for promotion, so if you are looking for a more responsible position now is the time to act.

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Member of the Computing Services Association

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For further details please contact:-  
BRIAN HOWLETT (currently at CMG (City of London) Limited 53-73 Leaman Street, LONDON E1 8EY or phone:- 01 481 3881

Please send me

An Application Form ☐

CMG 1978/79 Report ☐

Name

Address

Tel.  Quote Ref: B/1

## Programmer/ Analyst

### Marlow

Our Computer Services Department plays a vital part in the operation of the Lovell Construction Group. Based in Marlow we operate an ICL 2300 with 3K EDS 30 DDE, VDU and a network of intelligent terminals are being installed for the major companies operating within the Group.

We now wish to strengthen our small development team and are looking for a person with at least 18 months programming and systems experience in COBOL and 1600 RTL although training for the latter can be arranged. The successful applicant must be capable of working on their own and preferably have some experience of accounting systems.

The post carries an attractive salary and normal large company benefits apply.

Please apply in writing giving brief career and personal details to:

Personnel Manager,  
Lovell Construction Group,  
Marshall House,  
Station Road,  
Gerrards Cross,  
Bucks. SL9 8ER.

Lovell

## THE POLYTECHNIC, HUDDERSFIELD DEPARTMENT OF COMPUTER STUDIES AND MATHEMATICS

## SENIOR LECTURER or LECTURER (Two Posts)

Ref: ACA/279

Applications are invited for the above posts which are to support and develop the work of the Department in Computing. The successful candidates will be expected to undertake teaching, research and applications of computers in business and industry. Applicants must have appropriate experience of at least one of the following areas:

1. Information systems and systems design
2. applications programming
3. design and implementation of data bases

A good honours degree and/or MSc is essential. Staff will be expected to undertake activities including teaching, research and applications of computers in business and industry. The addition to teaching duties.

Salary: L1 £4101-£4888  
L2 £4081-£4768 (both £772) (plus 10% from the Personal Office, The Polytechnic, Huddersfield, HD1 3DH. Telephone: 0484 223311 ext 2233)

## PROGRAMMER TEST TECHNICIAN

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## UNIVERSITY OF KENT AT CANTERBURY

## Graduate Demonstrator in Computer Science

The post (available from 1 October, 1979) involves looking after a UNIX system running on a PDP-11 and used for teaching. Duties will include maintaining UNIX, upgrading and monitoring system for teaching needs, helping students with programming, and supervising projects.

Candidates should have a good honours degree in Computer Science and a lively interest in systems programming. An existing knowledge of the C programming language would be an added advantage.

The current salary scale (under review) is £384-£604

Applications forms and further particulars may be obtained from H. R. Clayton, Senior Assistant Lecturer, The Registry, The University, Canterbury, Kent CT2 7NF. Telephone: Canterbury 8822-231, 2431. Quoting reference A10/78. The closing date is 5 April, 1979.



# We see a rosy future in Walton on Thames and Croydon

## Systems Analysts and PL/I Programmers

The progressive environment of our DP Centre offers challenge and responsibility and will provide plenty of opportunities to those wishing to realise their full potential. Systems Analysts will be based at Walton on Thames, or at our head office in central Croydon, and should have around 2 years' relevant experience. Programmers, with at least 18 months' commercial IBM experience, will be based at Walton on Thames and will be retrained if necessary.

Competitive salaries, according to experience, are backed up by the benefits normally associated with a major company, including relocation assistance where appropriate.

We'd like to tell you more about that rosy future. Meet us for a drink and an informal chat on Monday 19th March and Tuesday 20th March between 12 noon and 8 p.m., in the Curzon Suite at the May Fair Hotel, Berkeley Street, London W1 (one minute's walk from Green Park Tube station).

If you can't make these dates, phone Vivian Fairhurst, Personnel Manager, on 01-686 8899. Or write to her at Brooke Bond Oxo Ltd., Leath House, High Street, Croydon, Surrey CR9 1JQ.

Brooke Bond Oxo Limited

Handwritten signature: J. H. Fairhurst



## Systems Analysts

### Career openings in a professional environment

North London

to £7000

Our client, part of an international corporation, develops and manufactures high technology equipment for the communications industry. They are totally committed to the use of computers in every part of their operations.

Currently engaged in a programme of planned expansion of their computer resources and applications, they wish to recruit ambitious systems analysts to work in small groups, developing cost-effective solutions in a wide range of commercial and manufacturing projects. They have sophisticated hardware, both mainframe and mini, using on-line, database and distributed techniques.

To take advantage of this career opportunity you should have a good educational background, followed by experience in data processing with a successful company and one year at least in a systems analysis role. You must enjoy challenging situations and have the social skills necessary to facilitate effective communication with users at all levels.

In return, our client can offer an excellent career path, enhanced by comprehensive training on the latest hardware and techniques. The benefits package is in line with major companies and includes full relocation and temporary accommodation if required.

To discuss these career positions in more detail, contact Peter Williamson quoting ref. 1810.



**Lloyd Chapman  
Associates**

123, New Bond Street London W1Y 0HR 01-408 1670

## Programmers

Salary £3,500-£6,000

N. London

ITT Business Systems are a supplier of communications systems for a wide range of customers throughout the U.K., Europe and many other parts of the world.

If you have been a programmer for at least 1 year and have experience in one or more of the following areas:

- minicomputers
- microcomputers
- assembler language programming
- real time programming
- message switching
- communications systems

then we would like to discuss with you the job opportunities at the Data Systems Division in Cockfosters.

We are a highly professional organisation

employing the latest Software Engineering techniques and currently require programmers to work on a variety of projects, writing in Assembler and ITT's high level language ESPL1. Our software development is performed using the large mainframe facilities of an IBM 3031 and 370/158, while product testing is performed on job hardware giving our programmers' hands on testing facilities.

As we are part of the large multi-national ITT organisation we can offer exceptional career opportunities both within the Division and within ITT as a whole.

To find out more please contact Frances

Mason, Personnel Officer, ITT Business Systems,

Diversey House, 1A Chalk Lane, Cockfosters

Road, Barnet. Tel: 01-440 4141.

ITT Business Systems **ITT**

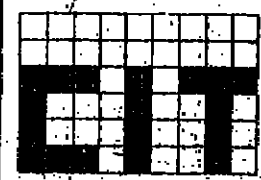
## Fortran Programmer

Cranfield Computer Centre, provides an experienced programmer to work on applications software in an educational/research environment.

The work will be mainly on a GEC4070 computer which is to be housed adjacent to the Institute's central computing system, an ICL 19031 operating under GEORGE 2 and MAXIMOP. The selected candidate will need to become familiar with

interactive computing methods, particularly on-line graphics. The post will involve close cooperation with engineering research staff working in a number of application areas. Applicants should have a degree and some experience in high level language programming, including FORTRAN. Starting salary within the range £4000-£5900. Generous holidays and sick pay scheme.

For further details and application form please write to: The Employment Office, Cranfield Institute of Technology, Cranfield, Bedford MK43 0AL. Tel: Bedford (0234) 750111. Ask 477 quoting reference 550/18.



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With a minimum of 3 years experience in commercial systems design and implementation. A programming background would also be an advantage.

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### Analysts/Programmers

Must have a minimum of 18 months commercial systems and programming experience.

### Programmers

Preferably with at least 1 year commercial programming experience.

Excellent salaries, comprehensive benefits and attractive working conditions throughout the Company.

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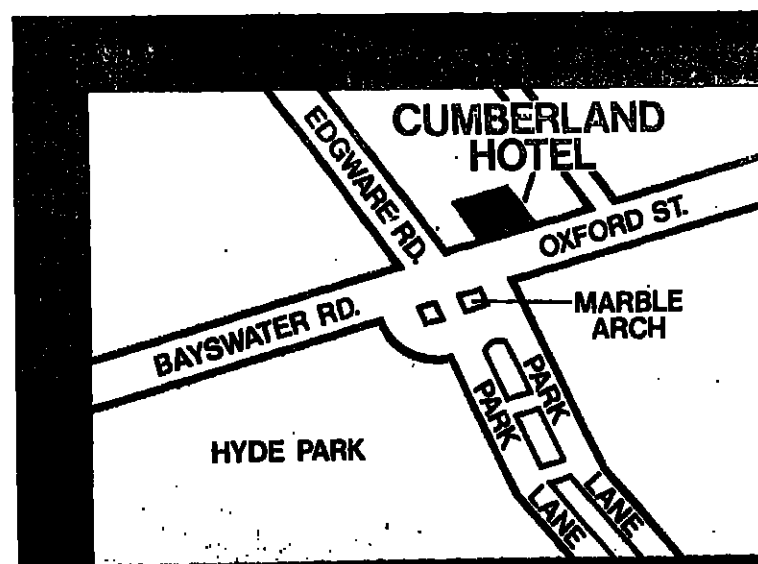
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## Informal Interviews

Come and talk to our  
Departmental Managers in the  
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March 19th-21st 10am-9pm.

### Systems Staff up to £8,500

#### Senior Analysts

For project planning, co-ordination and leadership. Applicants should have 5-6 years' sound experience.

#### Systems Analysts

To handle systems design, implementation and maintenance.

### Operations Staff

£4,500-£5,500

Operators are required with sound experience on a large mainframe. A three shift system, five days per week, is in force.

### Programming Staff up to £8,000

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Work entails participation in system design, program specification writing, quality control, and the supervision and scheduling of teams of programmers. Applicants should have around 5 years' meaningful computer experience using Cobol.

#### Programmers

Must be capable of producing correct programs within an agreed timescale. Cobol experience is essential.

#### Support Staff

Required to work in diverse areas such as maintenance/support/audit of operational systems, quality assurance/support of development systems, evaluation of packages etc.

### About the Company

We are a very large and nationally known organisation, an absolute leader in our main field of production.

We are a Middlesex-based Public Company, near Heathrow, the M3 and M4.

The D.P. operation is based on a large ICL mainframe, involves a large number of mini-computers (including communications) and uses the TOTAL Data Base Management System. Because of future additional commitments, a complete review of hardware requirements is currently in progress.

For all these positions the benefits include free life assurance, a contributory pension scheme, subsidised BUPA and excellent free lunches. Relocation assistance will be given where appropriate. A Company car is provided with certain senior appointments.

### If you can't make these dates

If you're interested, but unable to contact us during the interview period, please ring John Carter on 01-222 5734, who will then arrange a meeting at a later date.

### What you do

Just call in to see us or telephone us on 01-262 1234

100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200.



**JBA**

## Advanced Data Comms/Message Switch Systems Development

SCICON is a highly successful member company of the BP Group, with a growing international reputation for excellence in developing advanced systems and software. The Communications and Control Systems Division requires a number of high-calibre technical staff to augment their team in order to undertake an increasing volume of new orders and software development projects.

The division has access to a wide range of in-house mini/micro computers, including PDP11, NOVA 3, HP 1000, microNOVA, Intel, and Zilog. The computer room and micro-development workshop offer scope for those who relish a hands-on environment.

Professional staff are required in the following categories:-

### Technical Consultants salaries c.£9,000

Candidates must be able to show extensive involvement with either Data Communications or Message Switching software and applications. They should be keen to progress either in Project Management or in a Technical Sales/Sales Support role.

### Analyst Programmers salaries to £7,000

To join communications software development teams, candidates should have 2-3 years mini-computer Assembler experience. Ideally they will have been involved in writing basic software, i.e. drivers, protocol handlers, etc.

SCICON offer an interesting, challenging career in an environment where initiative and commitment are encouraged and rewarded.

For further information on the above vacancies please Contact: Margaret Stevens.

JAMES BAKER ASSOCIATES  
International Personnel Consultants,  
16 Maddox Street, London W1.  
Tel: 01-491 4478.

## Data Base

### Up to £10K

A top-bracket British international software house is starting work on new Data Base projects. Although, obviously, this calls for people with big Mainframe backgrounds, previously successful associations have brought this Client back to Real Time Mini's Place for help in finding:

### Project Leaders

#### to £10,000

You have to be applications orientated, with 5 to 7 years' large installation experience, including solid Data Base techniques. COBOL is essential.

### Systems Programmers

#### to £8,000

Software orientated, with 2 to 5 years' experience, using a low level language.

Whichever you are, Project Leader or Systems Programmer, you must be prepared to travel within the U.K. and, later, probably, overseas.

The perks are excellent. Pension, life assurance, house purchase and season ticket loan schemes are all part of the package.

To apply, simply dial 01-836 9719 or 9882 and ask for Beryl McLaren.

**Jupiter**

Computer Appointments  
(Real Time Mini's Place)  
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London WC2

## Computer Services Manager

### c.£7,000

G. A. Harvey Office Furniture Ltd. is part of the Bunterfield-Harvey Group and has recently consolidated its production facilities and office on the outskirts of Macclesfield. The opportunity has been taken to revise its bureau based computer processing and RJE terminals will shortly be installed. There is an ambitious programme to extend the use of computer processing for order entry, production and stock control and management information. In time, an in-house computer will be installed.

A manager, reporting to the Finance Director, is required to control the bureau operation and associated office procedures, and to assist the Company in its development of computer based systems. The position will appeal to someone who has played a major role in implementing a successful computer application including involvement in clerical support systems, and who now wants to manage and develop a computer utility. This is a key position with great scope and applicants, male or female, must be able to demonstrate management potential over and above mere technical competence.

The salary is negotiable and relocation expenses will be paid if the manager wishes to move to this attractive part of Kent which is close to several resorts and with good connections to London.

Please send adequate particulars, in confidence, to P. R. Billinghurst at:-

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3 Bevis Marks,  
London EC3A 7HL.

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PROGRAMMER/ANALYSTS £4786-£8136, SENIOR PROGRAMMERS  
£8242-£8743

### IMMEDIATE INTERVIEWS ARRANGED

by contacting Dave Hedley at the above address or phone number

TO BE CONTINUED IN 2 WEEKS

Forestry Commission, Research  
Division, Alice Holt Lodge, Farnham

## Mathematician/ Computer Scientist

This post is in the Statistics and Computing Branch which provides full support to the research programme of the Division. Current projects include silviculture and silviculture studies and forest management and protection schemes.

As a member of a team, the computer programmer appointed will undertake statistical data analysis, develop and document the Commission's computer data-base, implement models of current problems and manage supporting information files. The work will involve close liaison with statisticians and project leaders and programming in FORTRAN.

The computing facilities include an in-house IBM 1130 with 8-k store and exchangeable disk access through the IBM 1130 and a type of VDU terminals to a bureau UNIVAC 1100 and an IBM 360/195. A new in-house computer is expected within the next year.

Candidates, normally aged under 27, should have a Degree or equivalent in mathematics or computer science and a knowledge of statistical methods. Some programming experience is highly desirable. Appointment as Scientific Officer (£24,400-£30,000) with starting salary according to qualifications and experience. Promotion prospects, pension and contributory pension scheme.

For further details and an application form to be returned by 29 March 1979 write to Mr J. Freeman, Personnel Branch, Forestry Commission, 231 Corstorphil Road, Edinburgh EH12 7AT. Please quote reference: 500/100.

## DE HAVILLAND COLLEGE The Campus Welwyn Garden City, Herts DEPARTMENT OF COMPUTER STUDIES LECTURER GRADE II

Required from 1st September, 1979 to teach Computer Science and computing subjects, mainly based in Welwyn Garden City. Applicants should have both industrial experience and teaching training.

In Computer Science, the Department is seeking a Lecturer in Wood Applications. Applicants should have a Degree or equivalent in Wood Applications and be able to teach Wood Applications. Applicants should have a Degree or equivalent in Wood Applications and be able to teach Wood Applications. Applicants should have a Degree or equivalent in Wood Applications and be able to teach Wood Applications.

SRC

## SCIENCE RESEARCH COUNCIL

### COMPUTER PROGRAMMERS FOR SPACE RESEARCH

APPLETON LABORATORY has vacancies for COMPUTER PROGRAMMERS to work on data processing and control in support of a major International Satellite project, the Infra Red Astronomy Satellite (IRAS), which will be launched in February 1981. The Science Research Council has the responsibility for providing the satellite control centre and a scientific data analysis centre for this project which is a collaborative venture with the United States and The Netherlands. The main computers that will be used are two PDP 11/35 machines and a large ICL mainframe. Programmers are needed in the following areas:

real-time software  
large-scale data base handling  
orbit and attitude analysis  
scientific data processing

Posts will be available at both Scientific Officer and Higher Scientific Officer level. Applicants should have a degree, HND, HNC or equivalent qualification in Science, Mathematics or Computer Science, with at least two years' programming experience for the higher posts. The posts will initially be located at Ditton Park, Slough, but will probably be transferred later to Chilton, Oxfordshire.

Salary will be on the following scales (Outer London Weighting Allowance included), the exact step depending on qualifications and experience: £4376-£5723 for an HSO or £3114-£4690 for an SO.

Non-contributory pension scheme.

Please request an application form from:

The Secretary  
Science Research Council  
Appleton Laboratory  
Ditton Park, Slough SL3 9JX  
Tel: SLOUGH 44234, Ext. 153.

Closing date: 5 April, 1979

## RGP II PROGRAMMER

Applications are invited from Programmers with a minimum of 18 months' experience of RGP II (preferably ICL).

The successful candidate should be in their early 20's and be able to work with minimum supervision.

Salary will depend upon experience and qualifications.

For an application form apply to:

The Company Secretary  
Johnston Administration Limited  
Johnston House, Hatchlands Road  
Redhill, Surrey RH1 1BG

## HAMPSHIRE EASTLEIGH COLLEGE OF FURTHER EDUCATION Chesnut Avenue Eastleigh SO6 6HT LECTURER GRADE I in COMPUTER STUDIES

wanted from  
September 1, 1979.

Salary

£3,182-£5,334 p.a.

Further particulars and  
application forms available  
from the Principal (Tel:  
814444).

Share your knowledge with us and our customers  
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Lecturers are continually having their knowledge updated, giving the ideal platform for subsequent progression in an exciting and fast growing company.

And, as you would expect, our salaries and benefits are geared to attracting the calibre of applicant we are seeking.

Please telephone or write for an application form to Nick Phillips, Director of Education, Kings House, 174 Hammersmith Road, London W6 Tel: 01-748 4191.

**Honeywell**

**JBA**

## Software Manager

### Birmingham c.£11,000 plus car

We have been retained by a large international engineering group to recruit a Manager. The company have decided to centralise all of its European computer facilities to Birmingham and require an experienced Software Manager to set up the correct technical environment to run this new utility. The installation will operate under MVS with TSO and will offer IMS facilities to its users.

The position reports to the Director of the Centre and will be responsible for approximately twelve technical staff.

The job demands a person with excellent man management skills, a high degree of technical expertise and the potential for advancement to senior management.

This is an above average opportunity, with a salary negotiable according to experience and large company benefits including relocation assistance and BUPA.

For an informal discussion, please contact Jim Baker.

JAMES BAKER ASSOCIATES  
International Personnel Consultants  
16 Maddox Street, London W1.  
Tel: 01-491 4478.



Recruitment



in Informatics

## Software Development Experts Netherlands

Salaries to: £15,000

If you wish to relocate immediately to a permanent based career position in the Netherlands then read on... You must offer considerable expertise in two or more of the areas outlined below. Call us immediately because our client is conducting a series of interviews on our premises during the month of April. The required areas of expertise are: (a) Quality assurance. (b) Advising of development departments on usability. (c) Pre-sales support. (d) Problem solving. (e) Release preparation.

(f) Evaluation of new products. In addition to above average salaries our client will pay full relocation expenses, assist in obtaining permanent housing (which in the case of this company is more readily available than is usual in the West Netherlands) and will meet the cost of Dutch language courses for the employee and his partner. Of course, pension plan and health insurance are an integral part of the package. There are real opportunities for transfer worldwide throughout the company's organisation.

## Multi-National Banking Corporation City of London

Salaries: £6K - £9K

A prestige Banking Corporation with extensive computing facilities in the City of London, Germany, Switzerland and Italy requires additional Data Processing personnel up to Team Leader level for both its Mini and Mainframe divisions. The Mini Division essentially requires COBOL Programmers and Systems Analysts preferably from a financially orientated background. The mainframe Division has a need for PL-1 Applications Programmers who offer a second programming level either IBM BAL or

COBOL. The ability to work as a member of a project team under strict documentation and structured programming standards is vital. An important additional benefit for the more senior positions will be the travel prospects. Candidates can expect monthly travel to one or more of the Bank's other European Data Centres where new hardware and associated software is to be installed very shortly. Initial interviews will be conducted in the City within three weeks of the appearance of this advertisement.

## Systems Engineers Belgium

Salaries up to £15K

An internationally renowned supplier of Data Base and Teleprocessing Management Systems has requested Logistix to identify top calibre D.B. or T.P. Systems Engineers. Technically speaking you must have current experience in the implementation and support of Data-Base and/or Real-Time systems. Suitable applicants should offer IMS DB/DC exposure although due consideration will be given to those having extensive knowledge of an independent suppliers' software. You could presently be engaged in the areas of budgeting/forecasting, foreign exchange/investment or the presentation of products to both English and French

speaking executives within a seminar environment. Consequently whilst fluency in French is not a prerequisite, (since language courses can be provided at the company's expense) a certain knowledge of the language is desirable. The higher than average salaries (even for Belgium) reflect the prominence which our client places in the acquisition of these key personnel. Excellent benefits include full relocation expenses, life and disability insurance, pension/medical plans and a housing allowance. We will conduct first interviews after which candidates will spend a day with the company before offers are made.

## Graduate Commercial Programmers Central London

Salaries to £6K

We wish to hear from COBOL or PL-1 Programmers who may perhaps have joined their present company on leaving University or Polytechnic in the summers of 1976 or 1977 and who now wish to expand their programming techniques — perhaps Structured Programming or Michael Jackson's standards. Well, if that's the case then our client wants to make you a very tempting but realistic offer. Whether you have worked on IBM, ICL or Honeywell mainframes or DEC, Hewlett Packard or Data General minis, you will be given ample opportunity to further your skills either as a member

of an in-house project team or working solely or jointly with the personnel of the company's clients. Those who wish to convert their mainframe experience to mini involvement can be catered for quite easily since the company is only too happy to provide full training through the use of seminars and residential courses. TO APPLY: Contact any of our Recruitment Executives who will make arrangements to meet you or alternatively for those living outside London local arrangements can be made. If you cannot make telephone contact then please forward your up-to-date resume.

## Senior/Junior Software Designers Home Counties North

Salaries: £6K - £8K

A Micro-Computer Division within one of the U.K.'s largest indigenous organisations is seeking several Software Designers for its home based operations. The successful candidates will be assigned to the Applications Team, where they will conduct all the integral stages in the detailed design of new software modules; test the code procedures and integrate with existing modules. Candidates must offer a

minimum of two years Assembler Language experience although specific mini computer or micro-processor involvement is less important. Generally, candidates should have worked in a small Project Team environment within a Software/System House or Manufacturer. Interviews will be held on an on-going basis throughout the latter part of March and the whole of April.

Logistix, Freepost 32, London W1E 3YZ

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London W1N 9HALicensed by D.O.E.  
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01-491 4636



Telex: 28800

## Numerate Engineers Analysts Programmers

The System Problem Analysis Group of Ferranti Computer Systems Limited is an expanding organisation that undertakes analytical and scientific programming tasks for external agencies (in the UK and Europe) and in support of Ferranti's Real-Time System Projects:

### Our Work Includes:

- \* Signal Processing — Sonar and Radar
- \* Target Tracking — Active and Passive
- \* Fire Control Systems — Gun and Missile
- \* Computer Simulation — Event and Time Based
- \* Scientific Data Processing and Mathematical Analysis
- \* Control Systems — Continuous and sampled
- \* Microprocessor Systems — Design and implementation

We require new and experienced graduates in a numerate discipline to take part in our future expansion. Successful applicants will be capable of:

- \* making significant contributions in new fields
- \* communicating effectively
- \* liaison with customers

### We can offer:

- \* high job interest
- \* flexible working hours
- \* competitive salaries
- \* paid overtime and bonus scheme
- \* early opportunities for responsibility
- \* friendly, informal atmosphere

If you feel you can meet the challenge that our kind of work offers, then please ring our Recruitment Officer on Bracknell 3232, ext. 471, or write quoting ref. no. D/884/CW to:—

The Personnel Officer, Ferranti Computer Systems Limited,  
Western Road, Bracknell, Berkshire.

These posts are open to male and female applicants.

**FERRANTI**  
Computer Systems

## Saudi Arabia

Norconsult, a leading Norwegian firm of consulting engineers, are responsible for the planning and supervision of Saudi Arabia's telephone expansion programme. In Riyadh, the company has, for both technical and administrative applications, an HP 3000 computer with 512K memory, 10 terminals plus 4 graphical terminals and a calcomp plotter type 960 for A1 drawings (with digitaliser). Program languages are FORTRAN and COBOL. KSAM file and image data systems are used. There are terminals in Dammam and Jeddah.

The company requires:

**One Systems Programmer**  
aged 28 - 35, c. £11,500 tax free, ref. FY.1034-77

**One Operator Technician**  
aged 24 - 30, c. £9,000 tax free, ref. FY.1034-78

Candidates should have some 5 years' relevant experience, whilst previous Middle East experience would be an advantage.

One year single status contracts include free accommodation, 2 weeks' leave every 3½ months with air fares paid to and from the UK.

Please write with brief career details — in confidence — to A. R. Duncan, quoting the appropriate reference.

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## London & Southern

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MGT Systems — Acton — Urgent  
Honeywell TDS/IDS North London  
IBM TSO, IMS Herts  
IBM & ICL Various

6 months  
3-6 months  
1 year  
6-12 months

### Programmers

Honeywell Cobol — Over 30 vacancies  
Honeywell IDS Cobol N. London  
Honeywell IDS/TDS Surrey  
PDP Fortran — Bucks.  
MUMPS — Berks & Holland  
ICL Plan/Cobol N. London  
Honeywell TDS Maintenance Paddington  
DEC — Numerous — H. Counties

6-12 months  
6 months  
1 Year  
6 months  
6 months  
12 months  
6 months

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## Overseas

MUMPS — Holland  
CICS A/Prog. — Kuwait — Urgent  
IBM Cobol French or Portuguese Speaking — for Portugal  
IBM Software Progs. — Kuwait  
IBM PL/1 Progs — Holland  
IBM IMS or DL/1 — Holland

6 months/ 12 months

## Midlands

Honeywell IOS Cobol Analysts & Progs  
Honeywell L6 Cobol — Urgent  
IBM Fortran Progs — Staffs  
Univac Cobol Progs — Derbys.  
Cobol — IMS — DL/1 — Leics.  
ICL 1900 & New Range — Staffs.

1-2 years  
6 months  
5 months

## Northern

Honeywell TDS/IDS — Lancs.  
Honeywell IDS Analysts — Northumbria & Teesside  
L66 Cobol Progs. — Hull  
IBM CICS & DL/1 Doncaster  
IDS Cobol Analysts & Progs. Liverpool  
Univac — Lancs.  
IBM/ICL Cobol Progs. — Lancs.  
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southern electricity

## SYSTEMS PROGRAMMER

SALARY £4,200-£6,200

(Currently under review)

Southern Electricity are currently engaged on the development of an ambitious Engineering Computing System comprising two ICL 2950's, two PDP 11/34's and distributed control and information microprocessors. The main operating systems will be VME/K, George 2 plus, and RSX 11 M.

In order to achieve our development plans we are now looking for an ambitious young programmer to join the systems team who are responsible for looking after the various operating systems. Ideally the candidate should have a good programming background and some knowledge of JCL or SCL although all necessary training will be given. The candidate should also be educated to at least HNC level in a suitable subject and exhibit a lively enthusiasm for learning new techniques.

The post will be based at Littlewick Green near Maidenhead.

The starting salary will be determined according to the successful candidate's qualifications and experience.

Applications on forms obtainable from the Secretary, Southern Electricity, Southern Electricity House, Littlewick Green, Maidenhead SL6 3QB and returned to him quoting 23/79 by not later than April 3, 1979.



## Field Engineers required by a major computing company

Storage Technology Corporation is currently one of the most rapidly expanding companies in the line of computer peripherals. As a result we are constantly in need of good, experienced personnel in Field Engineering. We offer competitive salaries, good company benefits, and, above all, superlative advancement potential.

Anyone wishing to become a part of a dynamic field group that places emphasis on training and personnel advancement, should send his employment and salary history to the STC office closest to him.

U.K. Field Engineering Manager — Tom Kenyon 10-12 Old Court Place, Kensington W8. Tel: 01-937 9638.

Benelux Field Manager — Ghan Mosele 47 Boulevard du Souverain, 1160 Bruxelles, Belgium.

France Field Manager — Pierre Pinon 5 Allée du Bourbonnais, 78310 Maurepas, France.

German Field Manager — Volkmar Meyer Genfer Strasse 11A, Postfach 550147, D6000 Frankfurt 56, West Germany.

Candidates for Italy should contact J. Skaw — European Field Manager at the U.K. office address.

Candidates for European Technical Support should send applications to Cedric Barrie at the German office address.



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are looking for a career in a growing services company which puts technical achievement first;  
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### WE

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- commercial (mainframes to micros);
- telecommunications;
- database;
- automation;
- basic software.

are offering good career structure, salary progression, bonus, share purchase plan, season ticket scheme and opportunity to widen your computing perspective.

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Write, or ring: Erwin Schneider

TRIAD Computing Systems Limited, 42 Kingsway, London WC2B 6EX. 01-831 7211

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Apply your analysis skills to numerous application areas from a central site - one of five - in the heart of rural England. Our client is a large, quality engineering company with a number of UK sites and extensive overseas operations. Financial rewards are:

- Relocation to £1,675
- Gross Salary to £6,900
- £8,575!

Spearehead an application area for a new on-line system. Contact us for additional details, interview dates and a fact sheet - by phone or writing direct - and discuss with us what this opportunity will mean for you and your family. Do it now - before you miss the boat!

Phone 01-388 4523 or 01-388 4865 and ask for Jeremy de Bago or Richard Harvey.

**Job Associates**

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## Systems Engineers Programmers

### Advance your professional career in Southern California

Our client, a major American industrial concern with unusually deep capabilities in advanced technology, manufacturing and international marketing, operates one of the largest commercial data networks through a division with headquarters in a most attractive location in Southern California.

This network, widely respected for its technical superiority, features the most advanced equipment and techniques. The teleprocessing system - one of the largest in use in the private sector - is supported by IBM 3033 and Amidal 470V6 using a broad range of minicomputers for front-end processing.

Rapid growth has created a number of attractive openings for highly qualified professionals in several disciplines including:

- \* Application programming
- \* Database management systems

- \* Communication engineering
- \* MVS operating systems
- \* Telecommunication networking

Of particular interest are candidates who have extensive experience in developing complex application programmes in large scale on-line IBM environments using ALC, as well as those with broad minicomputer programming in ALC. Candidates should have HNC or B.Sc. qualifications and at least 3 years' directly relevant experience. London interviews will be arranged soon. Relocation and immigration assistance will be provided.

Applications will be treated in STRICT CONFIDENCE throughout by us and our California associates. Please send full CV with home phone number quoting 1204/CW to Philip Smith:

**Philip Smith**

Manpower Consultants  
85-87 Jermy Street, London SW1Y 6JD

# Over 75%

Of all EMS Candidates receive job offers annually. We have the top U.K. response record! EMS alone are in weekly contact with every U.K. installation, giving you instant access to top jobs. EMS - unrivalled in ability to propose the ideal career opportunity for you. And over 100 vacancies in the EMS group alone for future expansion!

### Systems Analysts / North-West

EMS urgently needs to recruit a large number of two years' plus experienced Analysts to work on a wide variety of commercial systems. Opportunities exist for involvement on real time, database and networking systems, as well as general commercial and merchandising systems. Working for a consultancy involves a variety of site assignments with later involvement supporting Turnkey Systems teams working in your home area. We offer excellent career development prospects with adequate opportunity to either specialise in local region support tasks, or the choice of national and inter-regional travel if required. Analysts should have at least two years' systems experience in a commercial or industrial environment. Relocation expenses will be paid where appropriate. Candidates should be aged 23 upwards and preferably hold a current driving licence.

Consultant: John Wood. Tel. 0782 623665

### Project Managers £6,500

Applications are invited from experienced Project Leaders and Managers interested in joining a rapidly expanding Turnkey group based near Central Birmingham on the Fiveways roundabout. We need professional, competent team Managers, capable of planning, scheduling and implementing modularised application systems, configured on mini and micro processors, to an agreed time scale. Ability to design and control the development and final testing of complete systems will be important, as will an adequate programming knowledge for quality checking the work of other team members. Ability to undertake feasibility studies and accurately assess and cost systems and programming requirements to fulfil total client requirements will be an important part of your managerial duties. A wide range of clients are available, covering all sectors of industry and commerce. Car owners will be preferential for this level of appointment as client visits and presentations will be involved. We seek mature, constructive thinkers capable of designing effective application systems and motivating teams assigned to them.

Consultant: Don Philip. Tel. 021-454 7908

### Top Turnkey Salesman

Numerous UK Positions - 10-15K Packages + Car

EMS urgently requires experienced computer salesmen to help with a deluge of mini computer turnkey enquiries. We currently market two major products, these being the Honeywell Level 6 and the Data General series. We cover the whole of the industrial and commercial sectors, necessitating salesmen to have sound marketing experience and being able to present a formal business image in a multi-user environment. Ideally, sales staff will already have a year's mini marketing experience, although a top maintenance salesman now starting to feel the pressures of the mini onslaught on the old, traditional base would equally find that his/her experience would enable him/her to attain vast turnover rapidly with EMS product prices and outstanding applications software support. We are looking for mini salesmen who already have attained sales in excess of £200,000. These people will achieve over £500,000 with EMS leads and support. Mainframe salesmen equally can easily double figures marketing entire networks on behalf of EMS. Mature sales presenters capable of achieving top earnings, with no cut-offs are urgently sought by the company to capitalise on the many opportunities already available. Excellent brochures and back-up facilities are available. Good earnings packages and top prospects are available throughout the U.K. Apply now for early interview.

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### Cobol, Assembler, Basic Programmers, £4,000 to £6,000

We urgently require up to 20 extra experienced programmers to work on a wide variety of Turnkey Systems Hardware including Honeywell and Data General systems. Prospects include a wide variety of commercial and industrial systems in addition to working on networks, database and on-line real-time systems. We offer the widest range of career development opportunities with constant project involvement on new technology. You will be constantly involved with modular programming working to tight schedules. Customer liaison will also occasionally be involved necessitating a good standard of communication and presentation. Excellent potential exists for motivated personnel. Join a rapidly expanding, fully equipped modern Data Centre with a central location in the commercial sector of Fiveways, Edgbaston, Birmingham. Occasional UK travel is available also for staff wishing to visit our Turnkey installations for systems implementation.

Consultant: Don Philip. Telephone: 02-454 7908.

### Analysts & Programmers, London & Home Counties To £7,000

We currently have a vast range of clients urgently seeking capable COBOL, ASSEMBLER and PL/I Programmers with at least one year's systems experience to work on a wide variety of applications projects. Our fully computerised job location systems will select dozens of vacancies matching your current experience in the first choice for his details of candidates successfully with our installation throughout the entire U.K. EMS why not follow the path of the professionals. Complete the EMS application form today and see how quickly you can get results for you, you won't be disappointed!

Consultant: Carol Friedman. Tel. 0782 623665

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With 5 years' computer experience on either ICL, IBM or Honeywell equipment, including 2 years' supervisory experience.

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• Variety. We can offer you variety of projects, equipment and location, and the range is growing.

• Immediate contracts. Dataskil's success story means we've got a range of assignments that are suitable for good experienced people now.

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Ring Linda Selwyn on Wilmshurst (0625) 532631 ext 41 or 43 or write to her at: Dataskil Limited, St Ann's House, Alderley Road, Wilmshurst, Cheshire SK9 1HQ. Please quote reference CW1294.

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£11000 + car

A dynamic man management expert is required to control a major DP department. Must have DMS experience, database and some knowledge of retail business. CITY.

### SYSTEM & PROG. MANAGER

£8000 + car

To control teams of Programmers and Systems Analysts engaged in stock control, distribution and group accounting. Candidates must have had programming and systems experience, preferably using Burroughs. CITY.

### COBOL PROGRAMMERS

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To work on shift maintenance and site enhancement. Must have four years COBOL experience. Five-week shift rota: two of which are day, one early morning, one late evening and one night. CROYDON.

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To £8000

Five years' BSL programming experience, with a knowledge of DOS/V8 or 360/70 mainframe installations, is required for this position. Supervisory or Team Management experience is necessary. Responsibilities include the specification and allocation of subordinates' work to achieve targets, and training junior team members. HIGH WYCOMBE.

### SENIOR ANALYST

£7500

Business Analysts required for development work in large consumer products manufacturing company. Must have two years' systems experience, from feasibility study to implementation. CROYDON.

### SYSTEMS ANALYSTS

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For information systems and technical records in DP department. Computer database techniques are employed with information retrieval facilities. Applicants should have at least two years' systems experience. Ideal position for future career advancement. C. LONDON.

### SYSTEMS ANALYST

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### PROGRAMMER

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Competent COBOL programmer required with at least two years' experience, for 2900 hardware installation. Excellent career development position, with prospect of transferring to Southern Ireland. Productivity bonus scheme in addition to salary. C. LONDON.

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Professional technical equipment manufacturer requires Analysts with three years' DP experience, to deal with project control from feasibility to implementation, specifications and design, etc. Knowledge of programming an advantage. WEST SUSSEX.

### TRAINEE ANALYST

£4000

To work for leading service company specialising in systems development. Suitable for a Programmer with two or more years' experience of commercial applications, who wishes to move into Analysts. Kent. HIL. CROYDON.

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# PROGRAMMERS WHAT ARE YOU WORTH.....

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- ★ training on new hardware/languages, etc...?

## ICL — WEST END to £5,400 + BONUS

Exciting development plans are under way at this large ICL 2800 installation where machines are expected to be upgraded within 6 months. Incentive bonus, £2.50 Lvs weekly and excellent pension scheme. REF. 2101

## IBM — MIDDX £5,500

European headquarters of major organisation seeks IBM or ICL COBOL programmers for their IBM 370 hardware to cover a wide range of projects. Have T.P. monitor and utilise database for which TRAINING WILL BE GIVEN. REF. 2157

## ICL — CITY to £5,500 + BANK PERKS

18 months' ICL 1900/2800 COBOL experience is all that is required for major British Bank. All NEW development; externally interesting projects and 2800 due for delivery. Excellent financial package. APPLY NOW! REF. 2094

## JUNIOR — ESSEX to £4,800 + MORTGAGE

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## PDP II — N. LONDON to £7,500

6 analyst programmers wanted TODAY! If you have any mini assembly or any high level language in your repertoire of the following areas, then you now have a chance to work on a new data acquisition, or air traffic control RELOCATION, paid overtime. REF. 2082

## HONEYWELL — MIDDX to £6,000

Excellent opportunity to join progressive company retaining Honeywell 66/80 equipment running under GCOS. Programmers should have minimum of COBOL prof. on Honeywell. But will consider other hardware. REF. 2182

## ICL — MIDDX to £5,000

Do you want to be trained in ANALYSIS? If so, you need minimum 2 years experience of ICL 1900 or 2800 COBOL experience to be eligible. We look forward to hearing from you. REF. 2070

## PDP — CITY to £6,500

Major overseas organisation with large network of PDP equipment seeks PDP11 Macro II person to work as a senior programmer on message switch systems. Device driving exp. asset EXCELLENT promotion prospects. REF. 1834

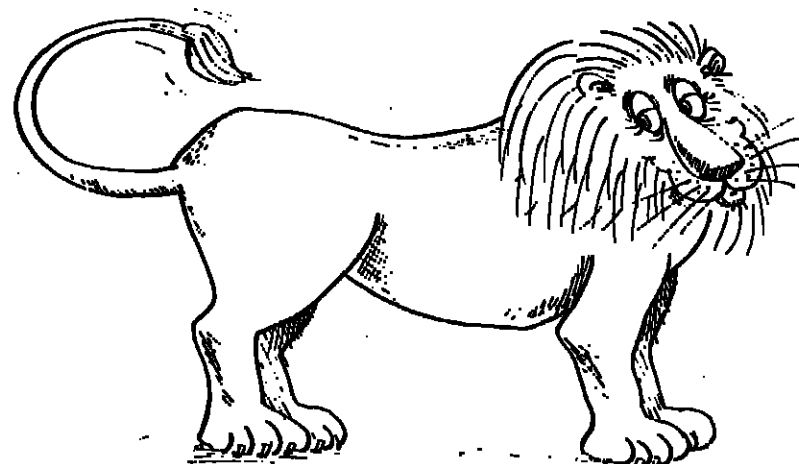
## IBM — LONDON to £8,000 + BONUS

Programming Manager is sought for expanding D.P. division. Qualities needed are good exp. IBM software, COBOL & PL/I with CICS, MVS and TSO being a distinct asset. Awaiting delivery of IBM 3031. Will work on own initiative. REF. 2115

## IBM — N. LONDON to £6,000

Small D.P. services division based north London seeks COBOL or PL/I programmer to join their friendly team. Company are awaiting delivery of 3031, thus knowledge of RPG or asset — although training can be given. REF. 2042

## WE'VE GOT THE LION'S SHARE OF THE BEST JOBS!



## RPGII LONDON to £6,000

International conglomerate is awaiting delivery of large IBM sys 34 equipment and have major development plans for new programmers. What an opportunity for someone with RPGII experience to make an excellent career? Non-contributory pension, £3.25 Lvs weekly, life assurance. REF. 2121

## ICL — HERTS to £6,200

Programmer analysts with 3 years' ICL COBOL to become totally involved in all aspects of company's systems and be prepared to contribute to development of dept. Co. has total assets of £2000 m. Exc. fringe benefits. REF. 2148

## IBM — KENT Neg. to £6,800

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## IBM — C. LONDON to £5,800 + Bonus

PL/I PROGRAMMERS STOP HERE! A great chance to become involved in latest IBM hardware! Organisation uses CICS/VSE and IMS/DB (experience will be an asset — but training will be given) with a 3031 scheduled for delivery. RING NOW FOR DETAILS. REF. 1840

## ICL/IBM — LONDON to £6,000

Major manufacturing and retail group is RAPIDLY expanding and needs additional programmers with ICL 1903/4 AND IBM sys 32/24 equipment, they seek people with 2 years COBOL and/or RPG experience. Training in analysis wherever necessary. REF. 2102

## IBM — CITY to £6,000 + MORTGAGE

Senior Programmer is sought for British Bank in the early stages of expansion. 2 years' IBM COBOL and/or ASSEMBLER is expected for this position in 370/138 installation. Excellent banking perks AND 6 weeks' holidays with a good career path in sight! REF. 2143

## MINI — LONDON £6,000 + NEG.

International commodity company seeks 2 mini programmers with BASIC & experience to work on major projects, one an accounting system, the other freight forwarding. Small friendly company and excellent career growth potential. REF. 2007

## IBM — SURREY to £4,900 + MORTGAGE

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## IBM — N. LONDON £5,500 + MORTGAGE

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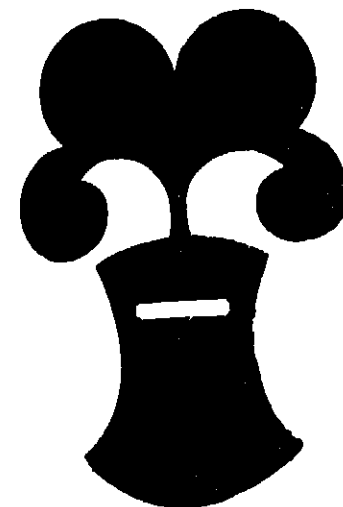
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Systems analysts with a minimum of one year's experience are required by our client. Experience on ICL hardware an advantage. Ref: 1102

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**SYSTEMS ANALYSTS  
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**SYSTEMS DESIGNER  
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**PROGRAMMER  
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Housing accommodation and assistance towards removal expenses may be available. A flexible working hours scheme is in operation. Car allowance will be paid to cover authorised travel during working hours.  
Further particulars and application form, returnable by 26 March from Assistant Chief Constable (Personnel & Training), Kent County Constabulary, Sutton Rd., Maidstone, phone (0622) 65432 ext 212.

Kent County Council



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If you can answer yes to these questions and you are looking for a challenging career in E.D.P. with the world's most popular jeanswear company, you are invited to send your C.V. to our Personnel Manager, Mr. R.J. van Veen, Levi Strauss Nederland B.V., Basileweg 59, 1043 AN Amsterdam. Salary commensurate with education and experience, 8% holiday pay, 13th month and other fringe benefits.

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DEPARTMENT OF  
SCIENCE AND TECHNOLOGY  
Post No. 7778

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The closing date for the above post is 30th March, 1979.

Application forms and further particulars may be obtained by sending a large, stamped, self-addressed envelope to the Principal, Hendon College of Further Education, Williams Building, The Ridgeway, Hendon, London NW4 6ET.

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PROGRAMMER**  
SPATIAL ALGORITHMS  
PROJECT

required to be responsible for initial algorithm investigation and implementation. Candidates should have appropriate programming experience.  
Appointment will be for two years only on the scale (under review) £2863 (first year) and £4133 (second year) with USS benefits. Applications, with the names of three referees, should be received by the Dean, School of Computing Studies and Accounting, University of East Anglia, Norwich NR4 7TJ, by May 4, 1979, from whom further particulars may be obtained.

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### UNIVERSITY OF YORK Department of Computer Science SENIOR COMPUTER TERMINAL TECHNICIAN — GRADES

Applications are invited for the post which will involve the maintenance and repair of the University's computer terminal equipment and computer systems. Experience in electronic equipment, computer systems and computer programming is essential. The successful candidate will be responsible for the maintenance and repair of the University's computer terminal equipment and computer systems. The salary range is £13,185 to £13,720 p.a. (plus pension). Applications should be sent to the Deputy Director, University of York, Heslington, York, YO1 5DD. Closing date: 28 March 1979.

The University of York is an equal opportunities employer. Applications from women are encouraged. The University of York is an equal opportunities employer. Applications from women are encouraged.

### THE UNIVERSITY OF BIRMINGHAM COMPUTER OPERATION

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Responsible for the development and maintenance of VME/B, superstructure products, other software products, compiler, etc.

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### PROGRAMMING SUPPORT

Responsible for providing specialist programming support and consultancy to the Applications Development/Support groups — including support of VME/B TP options and programming implementation of IDMS.

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£5513 to £7230  
An experienced chief/senior programmer to undertake the leadership of the specialist team, the maintenance and development of programming standards, evaluation and introductions of new programming techniques and Training of Programmers.

Starting salaries, within the grades quoted above, will be paid according to experience. (Salaries quoted include supplements but not phase 4 settlement). The Council will pay removal expenses, provide assistance for payment of legal fees, a disturbance allowance and a lodging allowance in appropriate cases. Written applications giving full details of Experience, Training, Age and Current Salary together with the names and addresses of two referees to:

**HEAD OF COMPUTER SERVICES  
NORTH YORKSHIRE COUNTY COUNCIL  
COMPUTER CENTRE, COUNTY HALL  
NORTHALLERTON DL7 8AL**

APPLICATIONS TO BE RETURNED NOT LATER THAN 23rd MARCH, 1979

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Development functions are the responsibility of Project groups under Group Leaders reporting to the Development manager — each group covering a varied range of applications with responsibility for the evaluation, development and implementation of new application systems and the support/maintenance of operational applications.

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Experienced Project Leader/Analyst is required to undertake investigations and evaluations of IDMS, provide specialist implementation support, establish installation standards/procedures and eventual administration of Data base activities.

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Experienced Project Leader/Analyst is required to lead an Applications development/support group.

### SENIOR ANALYST/ PROGRAMMERS

£4773 to £5568  
Experience of COBOL and a working knowledge of a sophisticated operating system essential. Experience of analyst will be an advantage.

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Contact Faye Ogilvie 9.30am-9pm

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Systems Analysts are required to support and assist the sales force, by the design and presentation of technical proposals to individual clients. You will preferably have experience in mini computers and a knowledge of O&M techniques or communications, and the ability to work in a pre- and post-sales environment.

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Initial responsibilities will include assistance with implementation of the systems being written by a software house. Once the machine has been installed the Computer Operations Manager will be responsible for:-

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Candidates, male or female, aged 30 to 40, should have sound experience in computing and computer operations.

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## COMPUTER OPERATOR

Our small but busy ICL 2903 installation requires a young person with operating experience to fill a gap in our operations team. Knowledge of ICL utilities or JCL would be an advantage as would the ability to work without supervision. We run two half shifts and you will be required to take responsibility for your section of the shift. Starting salary up to £3,500.  
Contact: Mr. M. J. Ferry, Brangreen Management Services, Flat-Time House, 253 High Street, Waltham Cross, Hertfordshire. Telephone: Waltham Cross 38787.

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Grade AD 3 £3,732-£4,148  
Applications are invited for this post within the Treasurer's Department. The Council has an ICL 7602 Terminal linked to the Lancashire County Council ICL 2970 Computer.  
The duties of the post would involve day-to-day operation of the Terminal, the training and development of computer systems and effective liaison for the Computer Liaison Office.  
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## Computing Operations Supervisor

ICI is seeking a COMPUTING OPERATIONS SUPERVISOR to be responsible for the day-to-day control of the Computer Terminal and Data Preparation Services in Millbank.

A new CMC Sovereign system is about to be installed which will provide the base for expanding the already extensive range of services available to users in Head Office.

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We are interested in meeting IBM systems programmers with any amount of experience under OS or DOS (education will be provided) who would be interested in joining our small (2 people) systems support group. Responsibilities for this position will obviously depend upon experience and this could easily mean leadership of the group. The work will involve general maintenance and performance analysis of the OS system and the specialist packages, installation of new packages, general troubleshooting and interfacing with the applications and production departments. (Language is no problem because our computer environment consists mainly of English people).

The successful applicants will receive a salary of at least £14,000 per annum (plus travel expenses) and relocation expenses for moving to Holland will be paid.

If you like a challenge and feel that a move to Europe is of interest to you, please send your curriculum vitae as soon as possible. Initial interviews will be held in London during the next three weeks and final interviews will be held in Holland giving you the opportunity to visit our centre.

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Applicants should have experience in Electronic Engineering with degree/HNC qualification and an interest or preferably experience in programming.

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For further details or an application form contact:-

A. G. Budd, Personnel Officer, M.E.L., Manor Royal, Crawley, Sussex. Tel: Crawley (0293) 28787.

**MEL**

## Technical Support Programmers Senior Cobol Programmer Systems Analyst

We operate from an IBM 370/168 (soon to be upgraded to a 3033) with 11 megabytes of memory, 100 gigabytes of Mass Storage, RJE links to other GM plants in the UK, IRELAND and EUROPE, IMS and TSO. Several vacancies exist in the following areas:-

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Candidates should be familiar with ASSEMBLER (and optionally COBOL), OS/JCL and IBM Utilities. A knowledge of IMS and TSO is desirable but training will be given where necessary.

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Must have experience of Systems Analysis and Specification, preferably in a manufacturing industry.

Experience of COBOL programming and IMS, preferably on IBM 360/370 would be an advantage.

### Senior Programmer/ Application Programmer

Must have experience of COBOL programming, preferably on IBM 360/370 with MVS.

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As one of the largest manufacturing companies in the world, the management and technical training facilities are unique. So whatever your professional status, the opportunities for advancement are very good indeed.

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Please write with full details of your qualifications and experience. Or if you prefer telephone Janet Morcom on Dunstable 64264 during normal company hours, or Gordon Rowe or Peter Sainsbury Ext 308 or Ext 418 up to 9pm Thursday and Friday evening.

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#### SITUATION WANTED

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They now need to increase their sales force to cope with the ever-growing market demand, both in the U.K. and Europe.

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Contact Fay Ogilvie or Tony McGrath, 9.30am-9pm

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

MANAGEMENT & EXECUTIVE SELECTION

## VICTORIA APPOINTMENTS LIMITED



**BELOIT WALMSLEY LTD.**  
BURY, LANCASHIRE.

### Senior System Analyst Junior System Analyst

Salary £6,000  
Salary £5,200

This International Manufacturing Company now wishes to recruit a Systems Analyst to be responsible for the design and implementation of a new Financial Project to be set up on Database.

The successful candidate will have a good business background, preferably with experience of manufacturing and financial applications. He/she will be highly self-motivated and User Orientated. This post represents an excellent opportunity to gain project management experience.

For the Junior Systems Analyst post we are seeking a programmer wishing to progress into Systems Analysis or alternatively a candidate with 6/9 months' systems analysis experience to join the manufacturing team engaged on the development of on-line systems.

The installation operates an IBM 370/138 (currently under review) using DL/I Database and pursues a comprehensive training policy.

The Company offers excellent terms and conditions of employment, together with usual benefits expected from a large company.

REF. CW 10279.

For an application form in respect of this and many other vacancies please contact Miss Val Halliwell, Victoria Appointments Limited, 24 Mosley Street, Manchester 2. Tel: 061-236 7319 (24-hour answering service) and 061-236 7417 or home 061-440 8134.

### CONTRACTORS

#### HONEYWELL

8500 GCOS COBOL PROGRAMMERS

8500 GMAP ASSEMBLER PROGRAMMERS

with good operating systems experience.

Required immediately for contracts in LONDON \* SOUTH

EAST \* MIDLANDS & AMSTERDAM.

starting now.

**FOCUS**

Computer Services Limited

### University of Wales UNIVERSITY COLLEGE OF SWANSEA Applications Programmer (Reclassification)

Applications are invited for the post of Applications Programmer in the College's Computer Centre. The Centre provides a service to the College based on an ICL 1904S which is also linked to an ICL 1904S/CDC 7600 system at the University of Manchester Regional Computer Centre. Applicants, who should have a degree or equivalent qualification, will be responsible for maintaining and development of applications programs and will also be expected to take part in the advisory and consultancy services to users. Experience in application programming or the use of micro-processors would be an advantage.

The salary will be on the scale £2,564-£3,801 per annum (interim review) plus US\$1000 bonus. The closing date for applications is 15th April 1979.

Further particulars and application forms (which may be obtained from the Personnel Officer, University College of Swansea) will be sent on request to: Mrs S. S. E. P. in which they should be received by Friday, March 30, 1979.



## MYRIAD

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£7500-£12000

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As one of the major companies in our field with a well-established professional reputation, we have both the resources and expertise to train you in the skills needed to carry out this challenging and rewarding work.

You must have a background in the computer industry, such as programming, analysis or any sales-oriented position. Without this essential grounding you could not be expected to give career advice to applicants or advise clients in major recruitment assignments. Under 35, you should possess the potential to succeed in highly sales-oriented situations in which you will have the freedom to work very much on your own initiative.

The wide range of activities encompassed by the work will undoubtedly surprise you. You will also be interested in your training and career development. To find out the answers and much more about the varied and interesting life as a recruitment consultant, contact us to arrange an informal discussion and we will also tell you about the outstanding long-term career opportunities available.

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants  
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

RPG II  
PROGRAMMER

SOUTH COAST

Our client company, Searle Manufacturing Co. Ltd., a major manufacturer of air conditioning and refrigeration equipment, currently wish to recruit an RPG II Programmer. The current hardware environment comprises an IBM System 32 with 24K memory running under OCL/SCP.

Reporting to the Company Systems Co-ordinator, the suitable applicant will be required to have a sound knowledge of RPG II. Some previous systems involvement would be an advantage. Initially the selected candidate will be involved in the coding, compiling and testing of new programs and amendments to existing programs.

The factory is situated in Fareham, pleasantly located only 10 miles from the sea, and is a short distance from the major centres of Southampton and the Hampshire New Forest. An attractive salary with staff benefits package and assistance with relocation expenses where appropriate.

Applications for this position will only be considered through Sanderson Executive; for further information please phone or write to Mike Beasley.

**Sanderson** EXECUTIVE RECRUITMENT  
TELEPHONE 0272 39302

MANAGEMENT &  
EXECUTIVE SELECTION

telephone 01-637 9611  
9.30 a.m.-9 p.m. THURS.-WEDS.  
(Mar. 15, 16, 19, 20, 21)

COMPUTER SERVICE  
ENGINEERS

COMPANY: Join this major international computer manufacturer whose pioneering systems have made them one of the most powerful forces in the industry. New systems, new applications and continuing expansion mean they can offer more first class opportunities to Engineers.

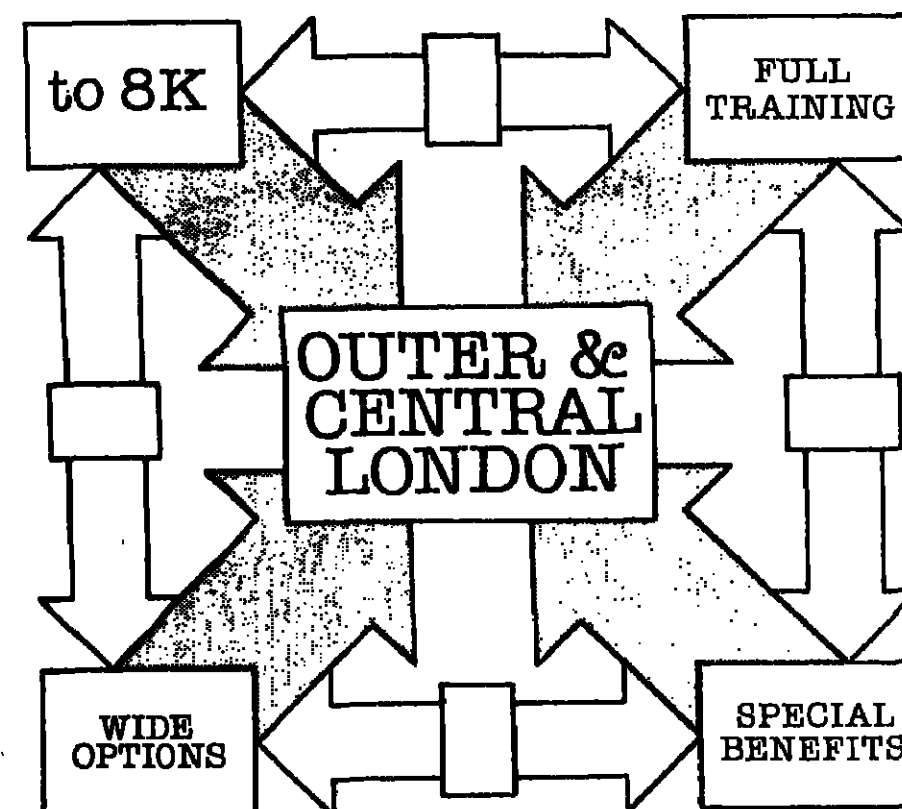
POSITIONS: Working with their teams of experts, maintaining mini and mainframe computers, on various customer sites in Central or Outer London.

QUALIFICATIONS: A minimum of an HNC (Electronics) or equivalent plus one year's experience of computer maintenance — but the more experience you have, the more senior the role offered.

BENEFITS & PACKAGE: Medical, Pension, and many other excellent schemes, as befitting a company of this stature. The package quoted excludes payments for overtime, standby, shift, call out etc. but includes Central London Allowance of £2000. Outer London positions provide company car and London Weighting Allowance.

For an improved career with an industry leader, contact Peter Gorton or Alan Slater today 9.30am-9pm.

P.S. Opportunities also exist elsewhere in the U.K.I

AMERICAN EXPRESS INTERNATIONAL BANKING  
CORPORATIONPROGRAMMERS/SYSTEMS  
ANALYSTS/PROJECT MANAGERS

Our Computer Systems Development Group are building sophisticated Real-Time TP systems using Honeywell Level 6/43 mini-computers. They have embarked on a comprehensive computerised project for which they now need additional computer staff. As a part of this team, you would be involved in simulating and challenging work in all aspects of systems design and implementations using state-of-the-art hardware and software. You would be joining a small group of highly professional people working closely in a friendly atmosphere, where all necessary training will be given and the opportunities for advancement considerable.

The Group is based at Moorgate in a modern air-conditioned building conveniently situated for commuter travel.

We are seeking:

PROGRAMMERS OR SENIOR  
PROGRAMMERS

with several years' experience of using High Level Languages, with a working knowledge of operating systems and Low Level Languages. Experience with the Level 6 range, or with commercial applications not essential.

SYSTEMS ANALYSTS OR PROJECT  
MANAGERS

with several years' experience of commercial systems developments with good implementation records.

These appointments are open to both male and female applicants and offer excellent salaries together with the usual Bank fringe benefits.

Please apply in writing, stating age, experience and career to date to:

Mr. E. J. Ralphs, Manager-Personnel  
AMERICAN EXPRESS INTERNATIONAL BANKING CORPORATION  
Tribute House, 120 Moorgate, London, EC2P 2JY

## CONTRACT OPPORTUNITIES

SYSTEMS ANALYSTS — North-West  
PDP11 ASSEMBLER — Cheshire  
IBM PROG./ANALYST — Yorkshire  
To £300 per week

Tel. IAN BACON 061-941 1922

**GEMINI Recruitment**

Computing Services Association  
Roberts House, 80 Manchester Road  
Altrincham WA14 4PL

COMPUTER CAREERS  
IN AUSTRALIA

## Challenge!

For details and brochure write to Computer  
Careers in Australia Agent-General for Victoria,  
Victoria House, Strand, London WC2R 4LG.

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Stay on Top.

Sales and  
Branch Managers and  
Systems Project Leaders  
for rapidly expanding  
business systems house

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DATA COMMUNICATIONS  
CORPORATION  
Thames House, 5 Church Street,  
Twickenham, Middlesex TW1 5NU.  
Tel: 01-892 8885 Telex: 6813327

We're DCC — one of the country's fastest-growing business systems houses. We're part of an international organisation and from a standing start in the UK just over a year ago we've opened a wide range of prestige accounts in commerce, government and the utilities. If you join us now you'll be 'in on the ground-floor' with a company that respects people who get results... so your career prospects will be excellent.

Right now we need more Sales and Branch Managers and Systems Project Leaders to sell and install a range of proven financial packages which use the highly successful Data General Computer range. They're recognised as the best in the business and cover all aspects of accounting systems, plus data collection, communications and distributed processing systems, property management and so on.

Ideally we need people who've had experience with a major manufacturer selling financial systems at all levels... but whose careers aren't keeping pace with their expectations.

If you're in Sales you'll be given a top basic salary, (almost certainly higher than you're getting now) a Cortina 2000 and commission based on realistic, achievable targets that will take your earnings up to the £15,000 a year bracket. For the right Systems Project Leaders they'll be given an improvement on your current earnings.

Just telephone Ken O'Toole (Marketing Director) on 01-892 3885 revealing the terms of the more convenient. Interviews will be arranged.

NORTH WESTERN REGIONAL HEALTH AUTHORITY  
COMPUTER SECTION

## SHIFT CONTROLLER

Salary £4,969-£6,028 per annum

Applications are invited from experienced computer people for this post in the operations section.

The person appointed will have supervisory ability and experience of controlling and scheduling the processing of data, and must be prepared to work on a shift rota basis for which an additional allowance of 15% of salary is payable. The shifts do not involve overnight or weekend work.

Application forms and further details from Regional Administrator, North Western Regional Health Authority, Gateway House, Piccadilly South, Manchester M60 7LP, or for further information telephone Mr. R. Dyson on 061-773 9211. Please quote reference number 1740A. Closing date 22nd March, 1979.

MID GLAMORGAN COUNTY COUNCIL  
EDUCATION COMMITTEE

## TEACHING STAFF

APPOINTMENT OF TEACHER OF COMPUTER  
SCIENCE—SCALE 2

Applications are invited from graduates in an appropriate discipline or persons with equivalent qualifications for the post of Teacher of Computer Science at the Mid-Glamorgan Schools Computer Centre. Teaching or lecturing experience in Computer Science an advantage.

Application forms to be returned by 28th March, 1979, available from the Director of Education, Mid Glamorgan County Hall, Cathays Park, Cardiff.

CANVASSING WILL DISQUALIFY  
W. ALWYN JONES  
Director of Education

COMMUNICATIONS  
—OPERATIONS  
SUPPORT

The University of London Computer Centre has a vacancy in the Network Support section of the Operations Group.

The recruit will join a small group responsible for the day to day support of the Centre's extensive data communications network. The work is varied and involves the analysis and rectification of technical and operational problems, also liaison with users, staff, and engineers. Shift working is required covering morning and limited evening shifts for which an allowance is paid.

Applicants should have a minimum of 6-10 years' experience of a "A" level should be an advantage. Some knowledge of computer operations and/or workshop practice would be an advantage although not essential as training will be given. Starting salary within the range of £3752-£3786 p.a. Inc. Applications in writing giving details of age, qualifications and previous employment to Mr. L. Tread, University of London Computer Centre, 20 Gower Street, London WC1E 6BT. Tel. No. 01-406 8400.

£4000-£7000+

North+Midlands

Analysts &

Programmers

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| 4Q? LOCATIONS ... A ... NATIONWIDE | LONDON, BRISTOL, BIRMINGHAM, MANCHESTER, LEEDS   |
| 5Q? PROFILE ... A ... EXPERIENCED  | SYSTEM SALESMAN OR TECHNICAL SALES ENGINEERS TO SELL INTO EITHER COMMERCIAL OR SCIENTIFIC MARKET             |
| 6Q? CONTACT ... A ... IMMEDIATELY  | FAYE OGILVIE OR TONY McGRATH, 9.30am-6pm   |

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637-9611

MANAGEMENT &  
EXECUTIVE SELECTION



## Ref: 11/1

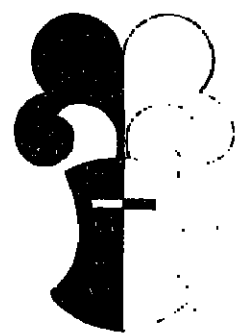
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#### RECRUITMENT CONSULTANTS

## MANAGEMENT & EXECUTIVE SELECTION





## KNIGHT PROGRAMMING SUPPORT LIMITED



### SALES EXECUTIVES

£10,000 + PER ANNUM + CAR

K.P.S.L. is one of the fastest growing companies in D.P. and believes in rewarding good people well.

After another successful year we want to expand our Sales teams located throughout the UK and Europe.

If you have experience in the computer services industry and can demonstrate success at sales and in dealing with people we would like to hear from you.

Call David Shepherd on 01-734 0152 and discuss the many opportunities which are available.

ROYALTY HOUSE, 72 Dean Street, London W.1. 01-734 0152.



4 New Bridge Street, London EC4V 6AA. Telephone: 01-353 1867

## PROJECTS LEADERS

circa £8,500  
CITY

We are a well established medium sized software house, which is officially approved by Burroughs, based in the City. We have recently won some very interesting and important contracts with well known companies and organisations who are Burroughs users in the London area.

We need two people or more to system design and subsequently lead these projects.

If you can show that you

- (a) have had some programming and systems experience on any COBOL based mainframe.
- (b) have had proven experience of successful project completions.
- (c) are able to talk easily and competently with clients.
- (d) are able to accept responsibility and cope with the self management that inevitably will all be part of the day's work.

then we should be delighted to discuss the prospects over an informal lunch, ring Peter Robbins on 01-248 5218 for your reservation.

**COMPUTER EXPRESS**  
(SERVICES) LIMITED

68 CARTER LANE, LONDON EC4V 5EQ  
TELEPHONE NO. 01-248 5218  
(SERVICES) LIMITED

c £7,500 plus  
**Purchasing Manager**  
SCOTLAND  
Electronics

Graduate or equivalent. Male or female age 35-45. Professional membership and experience of electronic component purchasing essential. American company experience desirable. Career opportunity with international travel and excellent fringe benefits which include re-location expenses.

Suitably qualified candidates please phone 01-493 7117 for application form quoting MRD 8064 (24 hour answering service).

**MRD**

Management Recruitment Division  
BOYDEN INTERNATIONAL LTD.  
11/15 ARLINGTON STREET, LONDON, SW1A 1RD.  
LONDON, PARIS, BRUSSELS, GENEVA, ROME, MILAN,  
MADRID, BARCELONA, TOKYO, HONG KONG, SINGAPORE,  
MEXICO CITY, SAO PAULO, AUCKLAND, MELBOURNE,  
SYDNEY, JOHANNESBURG AND THROUGHOUT THE USA.

## Chelmsford Borough Council SYSTEMS ANALYST/ PROGRAMMER

POST NO. 18  
GRADE S.O.1 — £5,232 to £5,569

The Council are looking for a man or woman with sound experience to join a small data processing section in the Finance Department. The position is a Univac 90/25 mainframe with disc and magnetic tapes and it is currently being upgraded with the addition of a V.D.U. and extra store. The computer handles an interesting variety of applications, mostly financial, and these will be extended with the addition of on-line facilities. Experience with RPGII would be an advantage but candidates with experience in other high level languages, preferably COBOL or BASIC ASSEMBLER would be considered. Applicants with practical experience in on-line systems would have a particular advantage. In appropriate cases the Council would be prepared to consider providing housing, accommodation and a grant would be made towards removal expenses. An experimental working hours scheme is in operation.

Application forms are obtainable from the Personnel Officer, Civic Centre, Chelmsford, to whom they should be returned by the 26th March, 1979.

# MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611  
9.30 a.m.-9 p.m. THURS.-WEDS.  
(Mar. 15, 16, 19, 20, 21)

## SYSTEMS ANALYSTS Initially to £8½k

- |                       |  |                    |   |
|-----------------------|--|--------------------|---|
| ★ <b>INVOLVEMENT</b>  | in new systems for mainframe and minis from feasibility to implementation. | ★ <b>ESSENTIAL</b> | — Programming knowledge.<br>— Systems background for senior jobs. |
| ★ <b>IMPLEMENTING</b> | financial, management, accounting and associated systems.                  | ★ <b>USEFUL</b>    | — IBM knowledge.  |

### OUR CLIENT

is a world-renowned International company with the systems facility very conveniently based in London.

### OPPORTUNITIES

for joining exist at all levels and career progression is both planned and expected.

### BENEFITS

include those normally associated with large International companies, i.e. flexitime, a first-class pension scheme, mortgage assistance, etc.

Contact Terry Bate — 9 a.m. to 9 p.m.

## IBM 370 RELOCATION ENGINEERS

An unusual and exceptional opportunity has just arisen for two experienced IBM 370 series engineers to join the new division of an internationally renowned company.

International  
Based London

to £13K package  
plus car

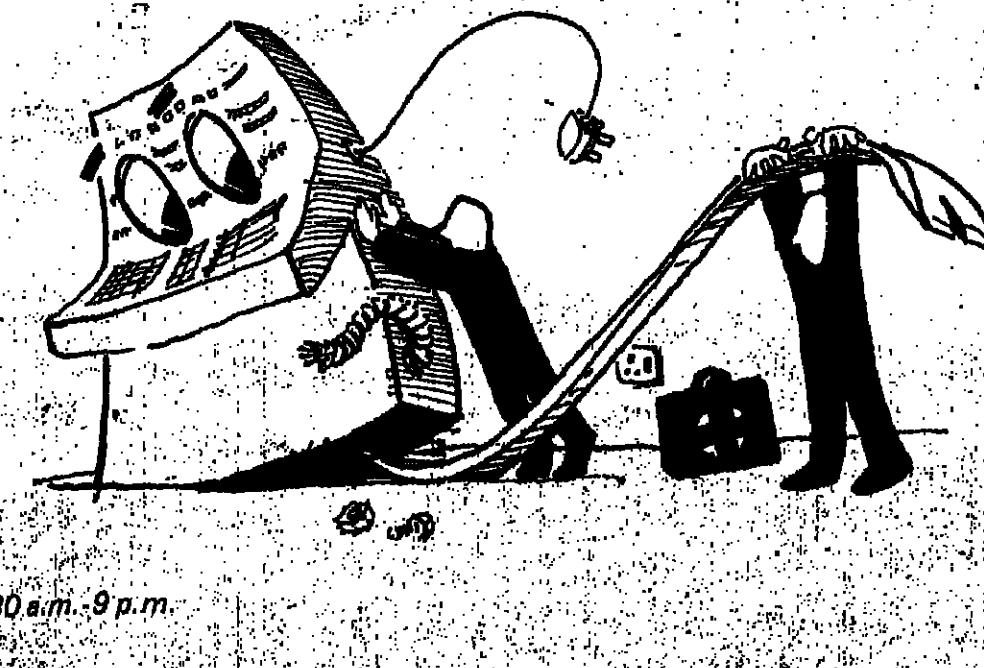
Those of you who prefer an independent, technically demanding role and thrive on variety, responsibility and challenge will definitely enjoy the work, which centres on the relocation of IBM 370 series mainframes across Europe. International travel is a fundamental feature, but trips are planned well in advance — unlike "Support." Time off in lieu/O.T. payments are provided an exceptional career progression is virtually assured.

Ideal candidates will have 145/158 experience but all applications will be carefully considered.

The additional benefits provided are very generous.

For the opportunity to go far quickly — contact Peter Gorton. 9.30 a.m.-9 p.m.

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611



MANAGEMENT &  
EXECUTIVE SELECTION

Anglian Water Authority

## SYSTEMS ANALYST

Up to £7.5K (NJC Grade 9)

Post Ref: H3D037

As one of the most advanced Honeywell large users in the UK we're into database and TP in a big way, using Honeywell's latest and best software.

Our first applications are underway. We now need another systems analyst to take responsibility for large scale integrated systems in the SCIENTIFIC AND TECHNICAL areas.

If you're an ANALYST with at least 5 years' systems experience you may fit the bill. The opportunity exists to gain experience of T/P and Database techniques — it'll be up to you to make your mark! Don't worry if your experience is not with Honeywell — we'll train you.

The closing date for application is 30th March, 1979, and should be sent to:

Miss Jenny Spencer  
ANGLIAN WATER AUTHORITY  
Diploma House, Grammar School Walk, Huntingdon, Cambs. PE18 6WZ

We're located in Huntingdon, an area of reasonable housing costs which offers a wide range of leisure pursuits. With Cambridge only a half-an-hour away — and within 1 hour of London by train, the overall quality of life is high.

The Authority offers excellent conditions of service and generous removal expenses if relocation is necessary.

If you're interested or want to know more about this opportunity, call Jenny Spencer at Huntingdon (0480) 56181 Ext. 370 for information and an application form.



## MYRIAD

## SOFTWARE ENGINEERS FOR INTERNATIONAL PROJECTS—HIGH-LEVEL LANGUAGES

N.W. SURREY

TO £7500

We are recruiting software engineers to design, write and fully test CROSS-ASSEMBLERS in FORTRAN or CORAL to run on PDP 11 equipment. Reporting directly to a project leader, the successful applicants will also liaise with customer and technical authors to produce program descriptions and user manuals. We are also seeking similar personnel to provide project support for a wide range of applications as well as systems support on new CDC equipment.

Candidates should have a degree in mathematics, computer science, electrical engineering or equivalent, coupled with at least three years' experience in the design of assemblers and programming in a high-level language. Lesser academic qualifications will be acceptable if linked with greater practical experience. Knowledge of DEC PDP 11 or CDC equipment will be a distinct advantage.

The company specialises in engineering/electronic projects, often producing both the hardware and software for bespoke systems. Their services range from operational research and management consultancy through project appraisal to final implementation. Customers are typically in transportation, agriculture, industry, defence and communications; therefore job-interest does not prove a problem for the employees. Located in the attractive countryside of Surrey, the modern offices are well serviced by three British Rail stations and there is a large staff car park next to the building. Road and rail routes are very accessible and provide quick transport to the West End of London.

Ref. S2/1503

MYRIAD APPOINTMENTS LIMITED Computer Personnel Consultants  
Telephone or write to:- 30 Fleet Street London EC4Y 1AA 01-353 0981 (24 hrs)

## PICA

## COMPUTING SERVICES LIMITED

VACANCIES exist at all levels within the PICA team to develop real-time software for applications in the Printing and Publishing Industry. All positions are newly created and initially associated with the development and support of Composing System 700 (CS7), the highly successful disc-based on-line Composing System produced in conjunction with Forrant Ltd. PICA offer unique opportunities for the right people to contribute to both the technical and commercial future of this product.

Current major projects are within commuting distance of our new offices at Feltham, Middlesex. Opportunities will exist to work on European projects.

## COME AND JOIN THE PICA TEAM

Applicants should normally possess a degree or similar qualification or have proven ability and experience. Two vacancies will be of particular interest to newly qualified graduates.

Top salaries will be paid to the right people, so if you are interested in working with an enthusiastic team in a challenging environment, please write for an application form to:-

Mr. P. Olorenshaw,  
PICA Computing Services Ltd.,  
4 Highfield Road,  
Feltham, Middx.

REDIFON COMPUTERS LIMITED  
COMPUTER ENGINEERS

We intend continuing expansion and require Computer Engineers in the following areas:

N.W. London/Hemel Hempstead  
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Central London  
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N. London (Enfield)  
Luton  
Birmingham  
Swansea (on site)  
Liverpool

We require people, male or female, who have either:

A minimum of two years experience on computing equipment and associated peripherals or formal electronic qualifications such as HNC or ONC plus digital experience, or relevant H.M. Forces experience.

Redifon offer attractive salaries, overtime and company car plus the normal benefits associated with an expanding, progressive company.

Apply to:  
MARION BARNES — Personnel Recruitment Officer  
Redifon Computers Limited  
17-27 Kelvin Way,  
Crawley, Sussex.

Telephone: Crawley (0293) 31211 Ext. 278.

## CLASSIFIED COPY

All classified copy should reach our offices no later than 5.30 p.m. on the Monday preceding Thursday's publication. If complete artwork is supplied 12 noon on a Tuesday.

Ring David Abbey for further details on 01-261 8016.

MIDLOTHIAN DISTRICT COUNCIL  
COMPUTER  
MANAGER

£8,822-£7,811 (inclusive of Supplement)

The District Council operate an I.C.L. 2903 Computer with 24K words main store and 3 disc drives. All input is currently via D.D.E. key stations. The installation is already processing several financial applications which are batch systems programmed in COBOL and RPG.

It is intended to develop further financial and management information applications extending over all services provided by the Council. This new post has been created to co-ordinate the planning and implementation of future applications and hardware enhancements. The successful applicant will also be responsible for the day-to-day management of the Data Processing Unit, including the existing staff of six persons, and will report directly to the Deputy Director of Finance.

Applicants should have widely based experience in Data Processing and proven management ability. An appropriate qualification would be an advantage but is not considered essential.

The District Council work a 36 hour week, with no shift working. A generous scheme of assistance with relocation expenses is available.

Application forms are obtainable from the Personnel Officer, Midlothian District Council, 1 Eskdale Court, Dalkeith, Telephone Number, 031-663 2881, Ext. 273, to whom they should be returned by 28th March, 1978.

SOUTH EAST THAMES REGIONAL HEALTH AUTHORITY  
PROGRAMMERS

£4,775-£5,680 (Scale 4)

£5,313-£6,378 (Scale 9)

(Salary scale depending on experience)

We are looking for people with a sound programming background; with particular emphasis on COBOL and GEORGE 3. Knowledge of structured design techniques would be an added advantage.

We provide computer services for hospitals and Health Authorities in South East England. The applications range from health-care and patient information systems to various commercial type systems which include payroll, accounting and supplies.

Our mainframe computer is an ICL 1904S (180K) with discs, tapes, printers, communications processor and MDP terminals. We have two ICL 2904 computers dedicated to remote transaction processing at hospitals in Bromley and Camberwell, both linked to the mainframe.

The Centre is situated in the grounds of Lambeth Hospital, close to the Elephant and Castle. It is easily accessible by public transport and free car parking space is available.

For further information and an application form, write or telephone: The Regional Health Computer Services Officer, South East Thames Regional Health Authority, Regional Computer Centre, Brook Drive, London SE11 7TA. Tel: 01-795 0071 ext. 28.

Royal Engineering College  
Manadon, Plymouth

Senior Computer  
Programmer

The College is primarily concerned with the education and training of naval Engineering Officers to achieve those standards required for chartered engineer status. It has extensive, well equipped Laboratories and computer facilities to support the activities.

The programmer appointed will be responsible for developing programming techniques and applications programming in the College, particularly computer graphics, and will advise staff and students in this area. In addition, the successful candidate will take responsibility for, inter alia, the design and implementation of a Computer Assisted Learning Package, the support of the GINO-F software of the Xerox Sigma 6 Mainframe Computer and advising on the selection, purchase and acceptance of equipment.

Candidates, normally aged under 30 should have a good honours degree or equivalent in an appropriate discipline and some programming experience.

Appointment as Higher Scientific Officer (400-£5450) or Scientific Officer (2840-£4400), according to qualifications and experience.

For further details and an application form (to be returned by 5 April 1979), write to Scientific Personnel Officer, Admiralty Underwater Weapons Establishment, Portland, Dorset DT1 2JS. Please quote ref: SA/11/FFA.

Science  
Group  
CIVIL SERVICE

THE UNIVERSITY  
OF ASTON  
IN BIRMINGHAMPROJECT  
PROGRAMMER

A vacancy exists in a research group which is constructing a bibliographic information system in conjunction with the Biodegradation Information Centre in the University. The project involves a variety of programming work, including the production of computer typeset output, software for a microprocessor, and the implementation of sophisticated information retrieval algorithms. This post is for a period of eighteen months only, in the first instance. Applicants should be graduates with a good working knowledge of at least one high-level language, and preferably some experience of assembly level programming. Salary within Research & Analogue Staff £3384-£3883. Application forms and further details to Mr. A.G. Rees, Staffing Department, quoting reference number 0/171/CW.

The University of Aston in Birmingham

Gosta Green  
Birmingham B4 7ET

## D.P. PROFESSIONALS — EUROPE

## WE ARE:

A small growing DP Management Consultancy, advising manufacturing, banking and mail order concerns in BENELUX. Our Clients have asked us to establish project teams to assist them in solving their problems.

## WE NEED:

SYSTEMS  
PROGRAMMERS

With relevant expertise (not just experience) in:  
IBM 370 DOS/VS and OS/VS internals, working knowledge of SNA and 3870 terminal concepts, Data communications and Data Base experience.  
ICL 1900/2900 DME/VME & ICL Data Communications and Data Base.

APPLICATIONS  
SPECIALISTS

Analysts/Programmers with at least five years experience in COBOL and/or Assembler, preferably, but not necessarily, IBM/ICL mainframes in the following fields:

Manufacturing, Banking & Insurance, Mail Order.

If you are interested in one of these positions or if you have something else to offer us not mentioned above, please write to us to hear from you.

We can offer promotion and salary prospects linked to your expertise and dedication, as well as a new, newly-founded company.

Please write or telephone: J. P. Karl, Managing Director, D.P. Professionals, 28, Theobalds Road, London WC1X 8PL.

MANAGEMENT &  
EXECUTIVE SELECTION

telephone 01-637 9611  
9.30 a.m.-9 p.m. THURS.-WEDS.  
(March 15, 16, 19, 20, 21)

REAL TIME  
SYSTEMS DESIGNERS  
AND  
PROGRAMMERS

Are you  
worth up to £9k  
to start?

CORAL 66  
ASSEMBLER,  
MACRO 11  
FORTRAN,  
etc

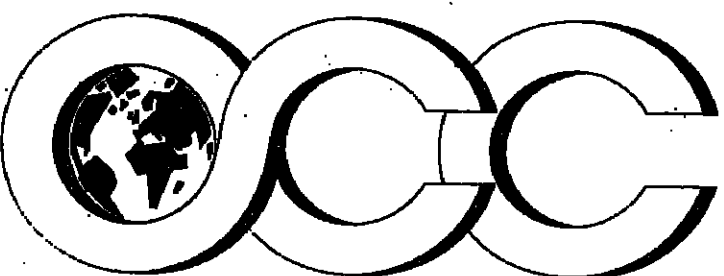
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The installation comprises a Honeywell level 66, with large database applications and on-line systems. These techniques are being further developed along with distributive processing and consequently there exists tremendous career opportunities for the right candidates.

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The benefits. Salaries will be negotiated according to experience. The usual large company benefits apply: e.g. 4 weeks holiday, bonus scheme, overtime paid, pension and sickness schemes, etc. If you are interested and would like to know more about these vacancies, write with details or phone (reversing charges):

Patrick Hand, Training Centre, International Harvester Co. of GB Ltd., Wheatley Hall Road, Doncaster, South Yorkshire DN2 4PG. Tel: 0302 66631 Ext. 111

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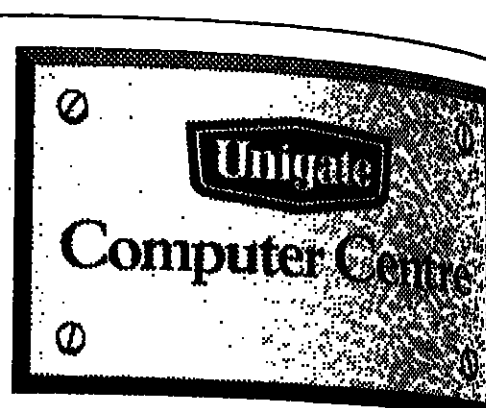
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Please write with an outline of career to date, stating degree of competence in languages and machines used. Please also indicate availability.

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## Univac Systems Programmer EXEC 8

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Written letters of application to:  
Mrs. B. Hawitt, Personnel Officer, Unigate Foods Limited,  
Bythesea Road, Trowbridge, Wiltshire.



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Farley Health Products Limited a member of the Glaxo Group, is located in Plymouth and manufactures and markets a range of Food and Health Products. We currently use a small general automation mini-computer and plan to extend its use into the fields of Inventory control, budgeting and accounting. We are looking for an Analyst/Programmer with mini-computer experience to be responsible for the technical design and programming of new work, as well as the maintenance of existing programmes. Help and advice on systems design is available. If necessary, from the group, but the person selected must be self-sufficient technically. All necessary conversion training will be arranged.

Along with the envisaged salary of £6,000, we offer fringe benefits and career opportunities appropriate to members of a major pharmaceutical group. Please apply, in writing, for an application form, giving brief details of age, education and experience to Mrs. E. M. R. Clement, Personnel Officer.

**Farley Health Products Ltd.**  
Torr Lane, Plymouth, Devon PL3 5JA. Tel: Plymouth 700000  
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## CITY OF BIRMINGHAM EDUCATION DEPARTMENT MICRO-ELECTRONICS DEVELOPMENT TEACHER

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Further details and an application form may be obtained from Mr. P. D. R. Vincent, Director, B.E.C.C. (Birmingham Educational Computing Centre), Hope Street, Birmingham B5 8TA.

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Please write, with all relevant particulars, to position Number AWD7226, Austin Knight Limited, London W1A 1DS.

Applications are forwarded to the client concerned, therefore companies in which you are not interested should be listed in a covering letter to the Position Number Supervisor.

AK ADVERTISING

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Candidates with insufficient experience for these posts may be appointed but on a lower scale.

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Application forms and further details of these posts are available from the:

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Grampian Health Board,  
1 Albyn Place, ABERDEEN. AB9 1RE

Telephone: 0224 29901 extension 3227.

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Mr. A. H. Bates  
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COM Services Division  
Financial Data Services Limited  
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London W2 4BU

or telephone 01-229 9431 for an application form

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Salary £3368-£4148 p.a. inclusive

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Closing date: 2nd April 1979

SOUTH NORFOLK District Council

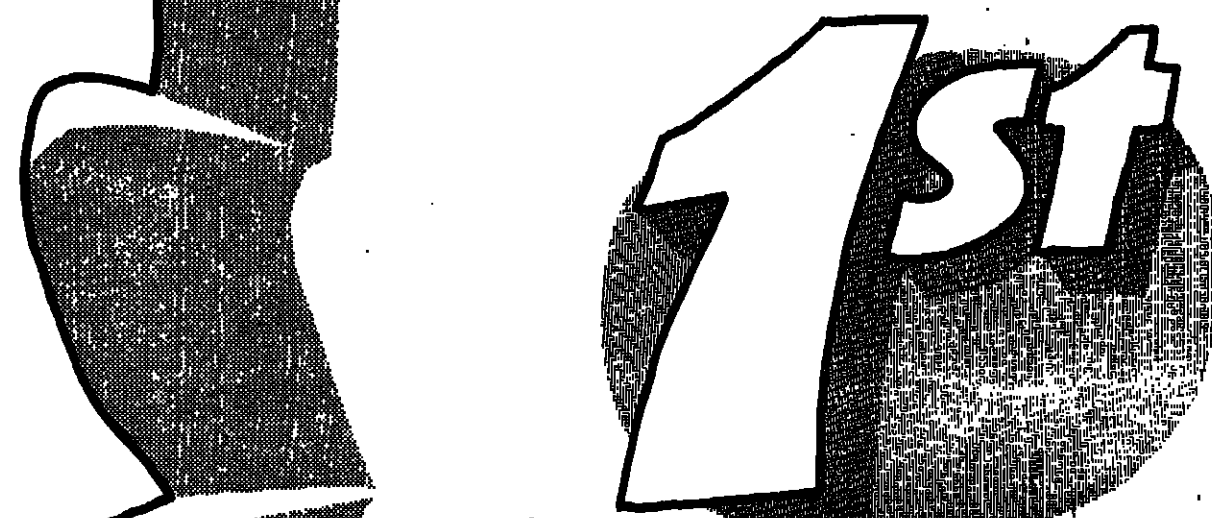
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### Programmers and Designers at Farnborough or Macclesfield

We have vacancies at a number of levels, from programmers with a minimum of three years experience to systems designers with, say, eight years plus in computing. Depending on your experience, specialist skills, and location preference, you will make an immediate start on one of a range of important projects in, for example, defence, business systems, or process control. In each of these areas we are industry leaders, and in any of them you will find all the opportunities you need for personal achievement, job satisfaction, and career development.

With a Group as diverse as Software Sciences there is likely to be an opening whatever your qualifications, but we are particularly looking for mini experience in either commercial or high reliability real-time applications. Your hardware background may be on DEC, Data General, Ferranti, Burroughs, or GEC; and you should have a comprehensive knowledge of one or more of Coral, RTL2, Assembler, Basic, Basic +, or Argus or Burroughs software.

Software Sciences is a European leader in software and systems so offers the career opportunities, rewards, and corporate backing to be expected at the top of the industry. At the same time we place a special emphasis on the product approach to industry-specialised hardware/software packaged systems and our work in this area is concentrated in our London office.

All that makes the Small Business Systems Group the right place to be at the right time if you are looking for the ideal combination of personal motivation and job satisfaction in a career minded company.

If you would like to join in the early days of the small business boom please send your c.v. to Sarah Chambers at our Farnborough Head Office or telephone or write for an application form. Interviews will be held in London. If you would prefer to discuss these vacancies informally first, then please telephone Peter Hatt, Manager of the Small Business Systems Group, at our London office (01 405 5993).

Software Sciences Comprite is the printing industry specialist subsidiary within the Software Sciences Group. It offers, therefore, an ideal opportunity for individual achievement based on personal responsibility and job satisfaction and backed by the strength and resources of one of the computing industry's leaders.

If that sounds like the opportunity you are looking for then please send your C.V. to Sarah Chambers, at the Group's Farnborough head office, or contact her by letter or telephone for an application form.

## Commercial Programmers and Analysts £5.5k-£8.5k

London-  
based

## Computers in Print £5k-£7.5k

Warminster-  
based

## Designers and Programmers for Bedford, Farnborough or Macclesfield

### Microprocessor systems

Software Sciences has been at the forefront of the microprocessor revolution and has already successfully applied this new technology to a number of major projects including currency exchange, point of sale terminals, and the UK bookshop Teleordering system. We believe that our commitment to this area is second to none in the UK software industry, and even the United States is buying our application expertise in this field.

In Software Sciences Micrologic we have a total 'design and build' capability for the application of microprocessors. This creates exceptional prospects for programmers and designers who can contribute to our growth in this area. Vacancies are in Bedford and there are opportunities to develop your career in a number of ways, from microprocessor software specialisation to a variety of management roles.

If you are interested in any of these vacancies please send your c.v. to Sarah Chambers at our Farnborough head office, indicating your preference. Alternatively, you may contact her by telephone or letter for an application form.

# datascene international

## IBM & ICL MAINFRAMES

**IBM 370 OS** £5400  
Deputy supervisor required by large Travel Co. 3 yrs + OS experience with some JCL knowledge. Excellent perks + prospects.

**IBM 370 OS** £5000  
North London Financial Installation requires senior operators with 2 yrs + experience. Perks include mortgage allowance.

**IBM 370 OS** £4400  
Operators with 6 mths + experience required by busy City based installation. Good prospects and plenty of free time.

**IBM 370 DOS** £4500  
Vacancies exist in all areas for operators with 6 mths + experience. In a variety of installations offering a wide range of benefits.

**ICL 1900** £4000  
City based installation requires an operator with 1 yrs experience, preferably on GIL. 2 shifts only and annual Bonus.

**ICL 2900** £4250  
Shift Leader required with 2 yrs + 1900 or 2900 experience. 2 shift working only and some company product discounts.

**ICL 1900** £5200  
Shift Leader with 3 yrs + GIL experience including knowledge of Macros required by manufacturing Co. 2 shifts only, salary currently under review.

**DATA CONTROLLERS**  
URGENTLY REQUIRED IN ALL AREAS  
SALARIES £3000-£6000

## ICL 1900 OPERATORS

East London to £3800 + BONUS

Our Client, the east London Computer Centre of a large Service Organisation requires operations staff with 6 months + 1900 experience. The hardware at present consists of a 1904A running under GIL. A replacement 1904S is planned later this year with a 2960 next year.

The company can offer excellent career prospects to ambitious operators. There are opportunities for proficient staff to move off shift into Programming, Production Control or Technical Support after a period of 2 years.

Other benefits include a quarterly productivity bonus scheme, opportunities for overtime, subsidised staff restaurant, pension scheme, and midweek rest days etc.

For further details call

Mike Harmer on 01.439.7871

## OTHER MAINFRAMES

**HONEYWELL GCOS** £4600  
Minimum of one years experience for senior operator on a large 66 system. Pleasant location and career prospects are excellent.

**HONEYWELL OS-2000** £4500  
18 months experience required for company in N.W. London. The main advantage of this position is no night shifts.

**UNIVAC EXEC 8** up to £6000  
At least three years experience needed for Senior Operator in an installation in C. London. A thorough knowledge of 1100 series is necessary for this no nights post.

**UNIVAC OS 3** £4300  
Senior operator with 18 months experience using OS3 is required for a fast developing site with two shifts.

**NCR B1** £4000  
Six months experience needed for junior operators post. All banking perks apply and no night shifts.

**NCR ANY** £4200  
An operator with 18 months good NCR experience who is ready for the CRITERION range is required for 3 shift job.

**DATA CONTROLLERS**  
URGENTLY REQUIRED IN ALL AREAS  
SALARIES £3000-£6000

## COBOL ANALYST/PROGRAMMERS

C. London to £6300  
One of the country's largest retail organisations is seeking several people with a COBOL background, but with an interest in other languages. They use a 370/145 & have development projects for a 3031 in COBOL, ASSEMBLER & DLI, & you will need around 18 MONTHS or more in any of these languages. Any Analysis or D/B experience would be helpful; however, training will be provided, making this an ideal opportunity to diversify your career.

Reference PG 11/1

## PL1 PROGRAMMERS

City to £6500 + Mortgage  
A national financial group require good PL1 Programmers to work on their twin 370/155's & PDP 11 equipment. They need around 15 MONTHS experience or more in PL1, COBOL or ASSEMBLER, & would also be willing to retrain in BASIC+ for new work on the PDP 11's. Other attractions include Flextime, Bonuses, and Subsidised Mortgages & Loans after 6 months.

Reference PG 11/2

## CONTRACTS

### PROGRAMMERS & ANALYSTS REGISTER NOW FOR IMMEDIATE & FORTHCOMING REQUIREMENTS THROUGHOUT

### LONDON \* U.K. \* EUROPE

DUE TO OUR CONTINUALLY CHANGING REQUIREMENTS WE ARE ALWAYS INTERESTED IN HEARING FROM COMPUTER PROFESSIONALS WITH A SOLID D.P. BACKGROUND TO WORK WITH MAJOR CLIENTS WHO ARE ALWAYS ABLE TO OFFER A WIDE VARIETY OF INTERESTING & CHALLENGING REQUIREMENTS.

REMEMBER: WE PROVIDE TOP CONTRACTS  
WE PAY TOP RATES

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TELEX 25851

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## TECHNICAL CONSULTANT

C. London £28000  
For people interested in the Software House environment there are currently vacancies in the Real Time and Communications fields within one of the best companies in London. You should have 5 years experience in either message switching applications, sales support, PDP 11's, turnkey systems or data communications and wish to progress into a Technical Sales/Sales Support Role. The company offers an excellent salary plus a full pension scheme, interest free season ticket loans, L.V.'s, staff purchase facilities and a house purchase scheme.

Reference HK 11/3

## BASIC + /BASIC+2 PROGRAMMERS

London & Home Counties to £8500  
We have several vacancies for programmers with at least 18 MONTHS BASIC + or BASIC+2. The vacancies range from Software Houses to in-house users. If you have experience on any mini using these languages please contact us now quoting the reference below.

Reference HK 11/4

## ASSEMBLER PROGRAMMERS

C. London to £7500  
This country's foremost Systems House is currently seeking as a matter of urgency several PDP 11 Macro Assembler Programmers & Analyst/Programmers. Your background should include at least 18 months programming in Assembler, not necessarily gained on PDP 11 equipment. In fact, if you have Mainframe Assembler experience and would like to transfer over to Mini systems these openings will provide the ideal opportunity. Any exposure to analysis will be more than welcome. The projects will all be pure development work in on-line systems for various large international PDP 11 users, and for the successful applicants there will be a real possibility of worldwide travel. The career opportunities are quite diverse ranging from Internal Management & Customer Support to Marketing & even Sales. On top of this they offer an excellent salary coupled with all the fringe benefits you would expect from a large company.

Reference HK 11/5

## FORTRAN ANALYST/PROGRAMMERS

City to £7500  
The Data Processing Division of a long established civil engineering giant is seeking a capable Analyst/Programmer to work on their growing range of products. These vary from management information packages to financial and technical modelling, with graphics. A minimum of 2 years FORTRAN coupled with some analysis is required and any knowledge of graphics would be an advantage. The company offers very good salaries with all the usual large company benefits.

Reference HK 11/8

## H/W & SW ENGINEERS

London & Home Counties £4k - £9k  
We have several vacancies for Hardware and Software engineers with commissioning or installation experience. Candidates should either have an electronics qualification (BSc/HNC) or good manufacturers experience. Knowledge of BASIC +, ASSEMBLER, FORTRAN or APL would be of distinct advantage, gained on either Mainframes, Minis or Micros.

Reference HK 11/9

## Software Sciences Limited

(Head Office) Abbey House 282/292 Farnborough Road, Farnborough Hampshire GU14 7NB Telephone 0252 44321

Offices in Amsterdam Bedford Brussels London Macclesfield Rugby Stockholm United States Warminster Wiesbaden

Datascene Recruitment Ltd.  
Sceptre House  
169-173 Regent Street  
London W1R 7FB

01-439 7871

datascene  
Computing  
Services  
Association

Datascene International Ltd. Telex: 25851  
Sceptre House  
169-173 Regent Street  
London W1R 7FB

01-439 1856



## Substantial advanced technology opportunities in South Africa

# Project Managers Software Consultants Computer Engineers

ICL in South Africa generates a substantial proportion of the Group's total international business. (In 1978 ICL Group turnover worldwide was up 22% to over £500 million). So we're big, we're stable, we're growing and we're amongst the first countries in the world to implement some of ICL's latest systems.

Our new range of 2900's represents one of the most advanced operating systems. Installation is therefore a demanding technological challenge.

Our fast growth leads to a 20% yearly increase in our staff. As a consequence, we are looking for top people who are technically competent in their specialist field. Obviously, previous experience on ICL equipment would be a considerable advantage.

Our specific requirements are as follows, and significant additional benefits go with all these appointments.

### Project Manager c R25,000

You would plan and manage new projects from their inception, leading and co-ordinating on-site project teams of up to 40 software and hardware specialists. You would be the main link between the customer and your specialists until the installation is in operation (on average about a year).

If you have Project Management experience we can offer you the opportunity to enjoy and outstanding technological challenge and earn around R25,000.

You will have difficulty in finding a position with a technical challenge or benefits equal to those you'll find with us.

### Software Consultants R18,000-20,000

Our project teams need specialists with expertise in one or more of the following areas:

- Communications
- Operating Systems
- Performance
- Conversion/Transition
- Superstructure

Experience on ICL equipment is obviously an advantage, but exposure to any large operating system is a recommendation. These are challenging positions, needing specialists of a high technical calibre, and we are offering a salary of R18,000-20,000.

### Computer Engineers c R14,000

Our Computer Engineers work in the style of the 1980's maintaining our new 2900 range. Any servicing therefore presents modern challenges that may involve software as much as hardware.

That's why we have become one of the first overseas ICL companies to develop a new-style Customer Service Division.

This is your chance to widen your software horizons. We would give you comprehensive training at our advanced training school.

You would then join the project team environment of our Customer Service Division where you would have a wide variety of challenges and be stimulated by the cross-fertilisation of ideas. Salary would be around R14,000.

Prospects? All of these positions offer considerable scope for personal career progression. Indeed it is our policy to develop and utilise fully the potential of our staff. Consider our growth, the excellence of our training, our policy of promotion from within, the wide experience you will gain . . . it would be entirely up to you, your abilities and your ambition.

After generous relocation allowances, our attractive packages will ensure you enjoy a high standard of living - the local spending power of the Rand is about the same as that of the Pound in Britain. Our fringe benefits are excellent, including pension & medical schemes, car allowances and generous leave allocations.

So why spend another winter in the cold? To apply please write to: Patricia Aldridge, ICL, Bridge House North, Putney Bridge, London SW6 3JX with full details of your experience, quoting reference CW1303. Or phone her on 01-788 7272 ext 2047. Interviews will be held in London.

## International Computers

think computers - think ICL



## You & The New Big Name In Computers

### HOME COUNTIES

**SALARY £6-£8,500**

When we refer to The New Big Name In Computers we are referring to an organisation with enormous resources, foresight, and inner strength, who produce a sophisticated range of powerful mini computer systems. Their current market status is a direct reflection of dedicated professional co-ordination and talent.

#### POINTS OF INTEREST

It is worth noting that in areas of production from Software Development to Commercial Applications this company offers more computer power per individual (INSTANT MACHINE ACCESS) than most others. They work in small teams ensuring a visible end product, a must for job satisfaction. The word "excuse" is practically eliminated within their set-up and rest assured there is always new and interesting development taking place.

#### WHERE DO YOU FIT IN

Fortunately this is a young and thriving company with a great deal to offer, whatever your status, a genuine career opportunity is open to those now involved in either of the following areas:

- 1) Basic Software Development
- 2) Commercial Applications (Programmer / Analysts or Analysts with Cobol)

For further details please contact Eddie Howard.

### REAL-TIME PROGRAMMERS

UK & OVERSEAS £ DEPENDENT ON LOCATION

Take advantage of our position as one of the leading recruitment specialists in the field of scientific programming. Today, more than ever, there is a demand for highly skilled personnel with the ability to tackle wide ranging projects in the design and development of scientific computer systems. If you hold a degree in a scientific discipline or have relevant practical experience of real-time mini-computer systems, using either ASSEMBLER, BASIC+, MACRO II, CORAL or FORTRAN, then give us a ring quoting ref. CW235.

### TECHNICAL SUPPORT PROGRAMMERS

LONDON AND THE SOUTH £6-£7,500+

You will play a very important front role assisting the sales team of a large international organisation. Responsibilities and duties will necessitate working on client premises periodically, ascertaining and compiling technical specifications which will assist the sales force to successfully accomplish their tasks. Applicants must possess a good commercial D.P. background along with a pleasing and helpful attitude. For further details please quote. CW236.

## Edmund Howard & Partners

6 BRIGHTON ROAD, SURBITON, SURREY, ENGLAND, TEL: 01-399 9183

Computer Personnel Consultants

## Analyst/Programmers To £5,454

We are an independent Mail Order Company based in Bradford, West Yorkshire. We have an expanding Systems and Programming Department, housed in modern offices, and we require additional staff to strengthen teams working in the following areas:

### IBM/DEC

We are shortly going live on a pilot Agency Accounting system which links distributed PDP 11/34 minis to our IBM 370/138. We need additional staff in both IBM and DEC teams to support the initial system and help in the next stage of development.

To join the IBM team you should have ASSEMBLER experience, ideally using DOS/VS. We also use COBOL so knowledge of this would be an advantage.

To work on DEC systems a commercial programming background on any hardware is required. We will train you to use our software environment, based on the RSX 11M operating system.

### ICL

You will undertake support work on existing systems which were developed for 1900 series machines and are at present being transferred to our new twin 2960's under DME.

You should have at least 1 year's PLAN experience and COBOL would be an advantage as we will be developing new systems using this language to run under the VME Operating System.

#### We Offer

- A negotiable salary up to £5,454
- Potential for promotion to senior scales rising to £6,943
- Paid overtime
- Flexitime
- Staff discount on all catalogue goods
- Relocation expenses

#### To Apply

Phone John Rhodes (ICL) or Howard Midgley (IBM) on Freephone 5092 (dial operator, ask for the number) or write to: Mrs. C. A. Davis, FREEPOST, Grattan, Bradford

*Grattan*

Apply to A-514



# THERE ARE ABOUT 20 SOFTWARE PEOPLE IN THIS COUNTRY WE WANT TO SPEAK TO.

## ARE YOU ONE OF THEM?

### The Company

We're one of the world's foremost mini-computer companies... each year announcing new highs in sales, earnings, computers sold, facilities occupied and people employed.

A major reason for our success has been the design of compatible hardware products that can be interchanged and function together as integrated systems backed by software that will function with almost any of our systems.

We plough back a significant amount of sales revenue into research and development... in fact we have one of the highest ratios in the industry.

The chart gives an indication of our growth and strength.

### The Position

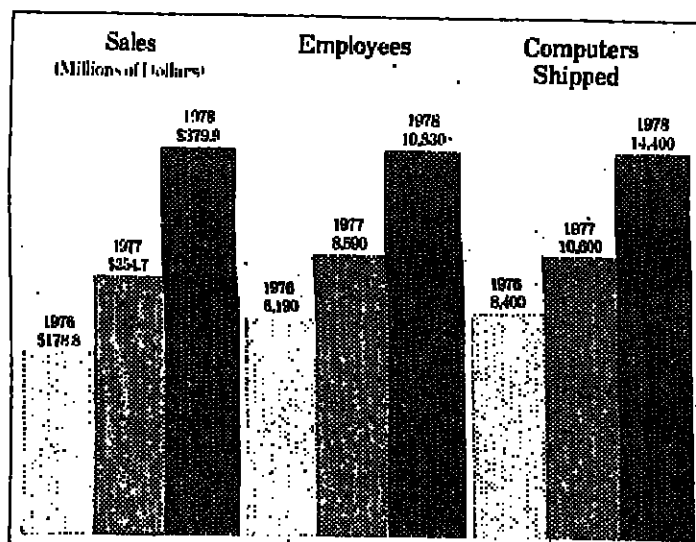
Right now we're looking for a Software Development Manager capable of generating the same growth for our new Software Development Group. It will be one of the tasks of the successful candidate to determine the most appropriate location for the most satisfactory operation of the Group.

The creation of the new Group emphasises the importance we place on software as a means of growth and of ensuring continued customer acceptance of our products.

You'll be expected to set up a highly professional team from scratch. Its major function will be the development of operating systems, compilers, communications, languages and application programs. We expect you to spend time in the U.S.A. to work in close co-operation with our American operation during the development of the new Group.

### The Opportunity

It is our intention that the new Group grows quickly but purposefully. You can expect excellent support from all levels. The corporation has more than doubled its expenditure on software development during the past few years and this trend will continue. This is an outstanding opportunity for a self-motivated professional man or woman, educated to degree level with at least 7/10 years experience in systems software development with a major computer manufacturer — preferably mini's — in managerial and other capacities. Alternatively you should have a minimum of 5 years experience successfully managing software development teams in a software house.



Letters of application should be sent to:  
David Daley, Personnel Manager, Data General Ltd.,  
3rd & 4th Floors, Hounslow House, 724-734 London Road,  
Hounslow, Middlesex TW3 1PD.

**Data General**

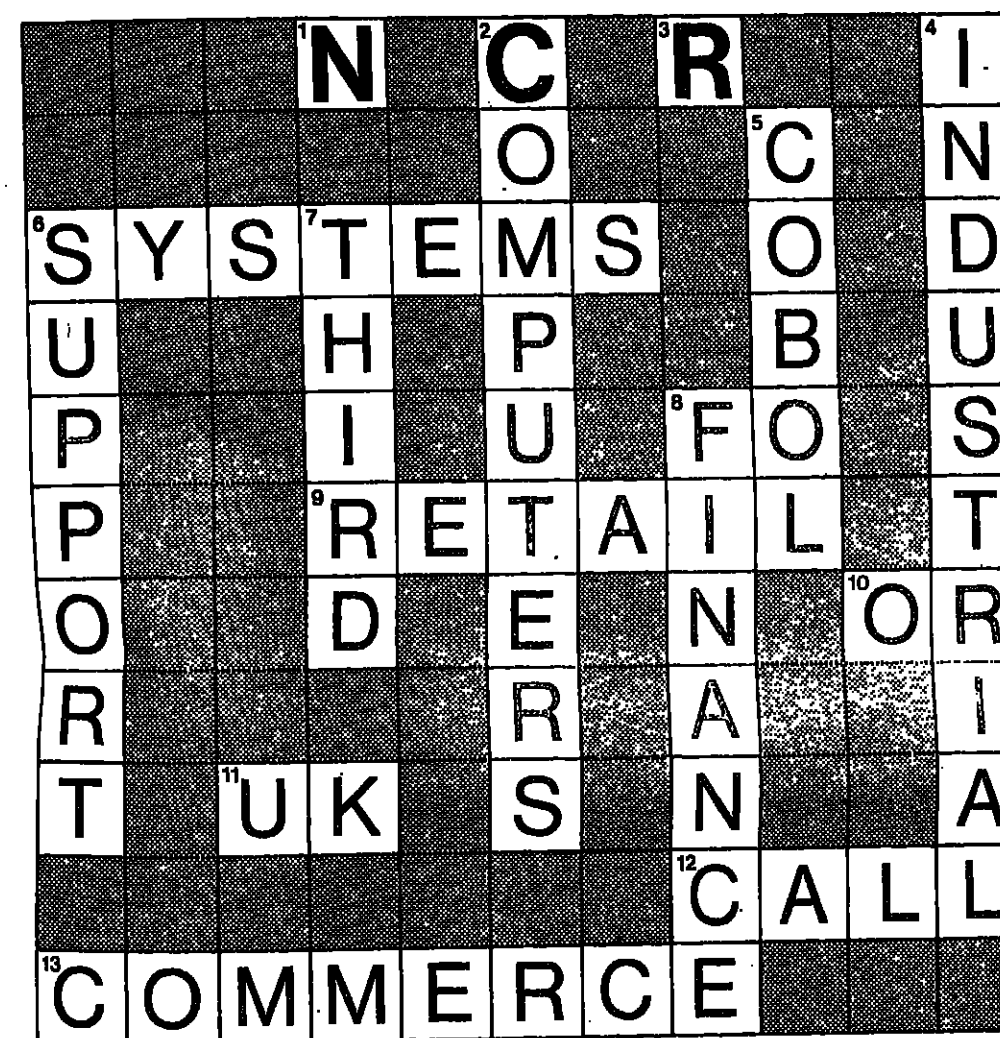
"Since Data General was founded in 1968, we have more than doubled the share of development expense associated with software. We expect the software share of total development expense to grow further in the future. It is the best investment we can make for our customers' sakes and our own."

*Edson D. de Castro*

Edson D. de Castro  
President  
Taken from 1978 Annual Report

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8 down — Banking, Insurance, Stockbroking,  
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8 across — Central Government

9 across — Food, Hotels, Supermarkets

13 across — Accountancy systems, Ledgers,  
Payroll.

A special programming language? — 5 down.

Where are the jobs?

All over the 11 across.

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Write 10, 12 across CAPP ASSOCIATES

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AND PROGRAMMERS — MAINFRAMES, MINIS  
AND MICROS. ACROSS THE UK, IN ALL  
FIELDS OF BUSINESS JOIN NCR — THEY  
WILL PAY YOUR WORTH.**

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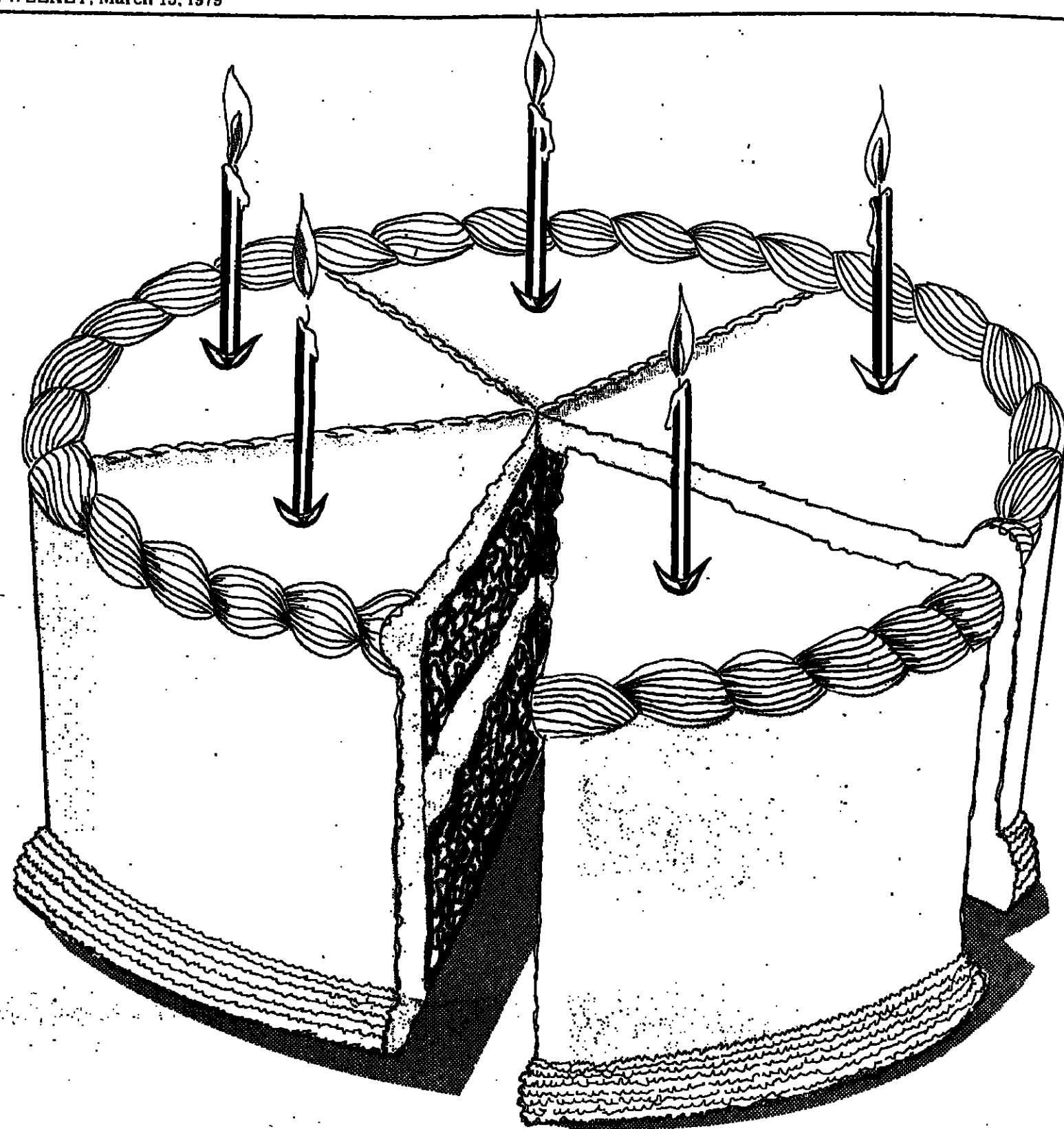
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## Our five year development programme.

It's a cut above the average career opportunity.

That's five years of solid innovation in systems and software which will really give you something to get your teeth into. Year one, 1979, will see the implementation of interactive programming facilities, plus a comprehensive training package using audio-visual equipment. Plus a further four years of things you'd like to be working on, including on-line applications for our unit trust and insurance departments.

Save & Prosper is the largest trust and equity linked life assurance group in the UK. We also market a wide range of other financial products like annuities, pension schemes, school fees and life assurance policies.

Getting to the forefront of our business has already meant building a pretty sophisticated computer environment. Our IBM 370/148 operates under DOS/VS, GRASP/VS and CICS/VS using remote and local 3270 VDU's, 3340 disks drives and 3240 tape units. We have 28 software packages installed, plus in-house written software.

So you can see that we drive our development projects through to completion. Multi discipline project teams are essential part of this attitude, and we need these people to join those teams now.

**SYSTEMS PROGRAMMERS c. £6,000**  
You must either have a minimum of 2 years' Systems Programming experience in DOS/VS environment, and have successfully completed at least one DOS/VS system generation, or a minimum of two years CICS

experience including some knowledge of CICS generation.

**ANALYST/PROGRAMMER c. £5,500**

With a minimum of three years' programming experience in either COBOL or ASSEMBLER plus some experience in analysis.

**SENIOR PROGRAMMER c. £5,000**

You should have at least four years' experience in COBOL and ASSEMBLER.

**PROGRAMMER c. £4,500**

With a minimum of two years' experience in either COBOL or ASSEMBLER.

The 'fringe' benefits include non-contributory pension and life assurance, BUPA, company assisted savings plans, luncheon vouchers, paid overtime and flexible working hours.

Altogether, a very nice package. But remember that we're an ambitious company. We want ambitious people, specialists with real skill and genuine ability; who can take full advantage of our planned, progressive career structuring.

We want people who are a little bit out of the ordinary. A cut above the rest. After five years development with us, you'll have plenty to celebrate.

Why not telephone (01) 554 8899 and have a chat with John Parodi, Mick Chivers, Tony Ward or Des Cunnane.

Or write to Matthew Dickinson, Save & Prosper Group Limited, Arodene House, Perth Road, Gants Hill, Ilford, Essex.

SAVE & PROSPER GROUP



FACILITIES MANAGEMENT BUSINESS SYSTEMS CONTRACT STAFF SUPPORT RECRUITMENT CONSULTANCY  
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# HEXAGON offers minimum £5000 reward for Contract Systems Analysts who are earning £8000 and wish to earn £250 to £300 per week.

## CONTRACT DIVISION

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Payroll package specialist — East Midlands — 3-6 month contracts.

Two Senior (mini) Systems Analysts — Surrey — for min. 1 year contracts.

Systems Analysts — City and South London — to work on sales and nominal ledger applications — 6 months to 1 year contract.

Senior Analysts — Berkshire — for on-line material control and order processing — 6 months to two years.

City Analysts with strong banking experience, clearing or merchant experience for data base and on-line work.

### PROGRAMMING

A CCP/RPG2 Project Leader for long term City contract to **£300 p.w.**

Mark IV Specialist — for Central London — **£250 p.w.**

DOS, CICS Systems Programmer — Hertfordshire — to **£350 p.w.**

Dozens of other immediate contracts for

MACRO 11 — Kent  
OS COBOL — Herts  
DOS COBOL — West End and Surrey  
UNIVAC, COBOL — Essex  
BAL — City

### OPERATIONS

George 2 Operators for indefinite contract — Herts — **£130 p.w.**

Burroughs B/3700 Operators for 12 months — City — **£135 p.w.**

IBM OS JCL Writers — **£140 p.w.**

Peripheral/Terminal Operators — **£100 p.w. +**

## PERMANENT RECRUITMENT DIVISION

### PROJECT LEADERS SYSTEMS ANALYSTS ANALYST PROGRAMMERS PROGRAMMERS

It doesn't matter who you are or how much experience you have got if you want to move, promote yourself or perhaps it's time for a change.

Hexagon's permanent recruitment division can help. Here is just a small selection of our current client requirements.

### LONDON

Project Leaders £ Your asking price  
COBOL Programmers, banking to **£7,000 + travel**

PL1 Programmers c. **£6,000**  
Systems Programmers from **£7,000**  
Assembler Programmers to **£6,600**  
Systems Analysts c. **£7,700**

### HOME COUNTIES

Project Leaders to **£8,300**  
Analyst/Programmers/RPG2 to **£7,000**  
COBOL Programmers to **£7,000**  
Analyst Programmers, Assembler to **£6,000**  
Systems Analysts to **£7,800**  
BAL Programmers to **£8,000**  
PL1 Programmers to **£6,500**

### WEST COUNTRY

Project Leaders c. **£7,000**  
Systems Analysts, Assembler c. **£7,000**  
COBOL Programmers to **£6,850**  
Assembler Programmers to **£5,500**  
Analyst Programmers to **£7,000**

### PERMANENT OPERATIONS

Programmers IBM Operators  
DOS/VS Senior Operators — Croydon — **£5,300**  
DOS/VS Operators — City — **£4,400**  
OS/VS JCL Writers — Bedfordshire — **£5,500**  
OS/VS2 JCL Writers — Middlesex — **£6,200**  
OS Deputy Shift Leader — London — **£5,800**  
DOS/VS Chief Operator — Essex — **£6,000**

ICL Operators, GEORGE 2 and GEORGE 2+ — Herts, City and North London — **£5,500 p.a.**

Honeywell 66-6 COS Operators — North London — Minimum 1 year's experience — **£4,000 p.a.**

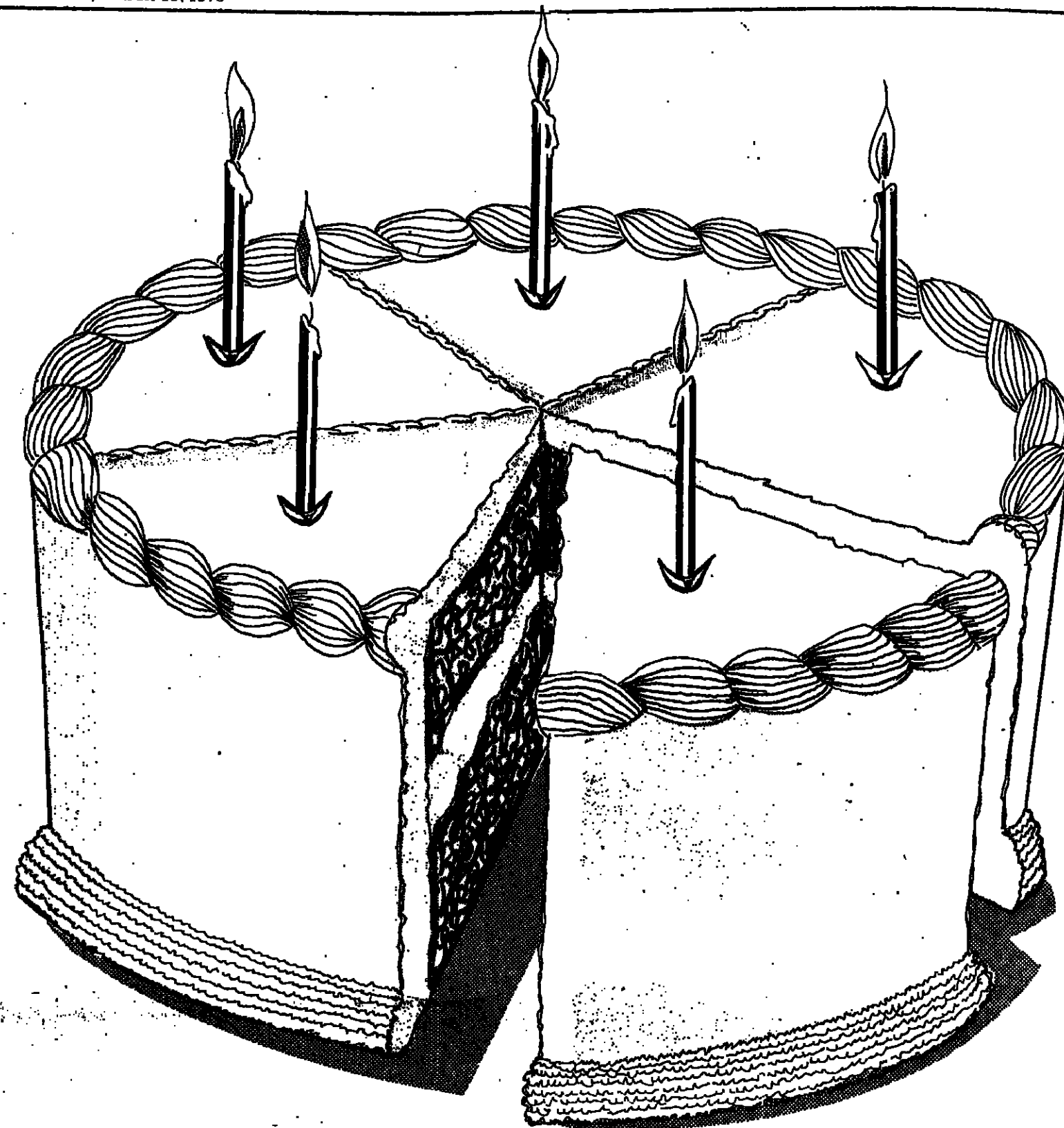
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## Our five year development programme.

It's a cut above the average career opportunity.

That's five years of solid innovation in systems and software which will really give you something to get your teeth into. Year one, 1979, will see the implementation of interactive programming facilities, plus a comprehensive training package using audio-visual equipment. Plus a further four years of things you'd like to be working on, including on-line applications for our unit trust and insurance departments.

Save & Prosper is the largest trust and equity linked life assurance group in the UK. We also market a wide range of other financial products like annuities, pension schemes, school fees and life assurance policies.

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**SYSTEMS PROGRAMMERS c. £6,000**  
You must either have a minimum of 2 years' Systems Programming experience in DOS/VS environment, and have successfully completed at least one DOS/VS system generation, or a minimum of two years CICS

experienced including some knowledge of CICS generation.

**ANALYST/PROGRAMMER c. £5,500**

With a minimum of three years' programming experience in either COBOL or ASSEMBLER plus some experience in analysis.

**SENIOR PROGRAMMER c. £5,000**

You should have at least four years experience in COBOL and ASSEMBLER.

**PROGRAMMER c. £4,500**

With a minimum of two years' experience in either COBOL or ASSEMBLER.

The 'fringe' benefits include non-contributory pension and life assurance, BUPA, company assisted savings plans, luncheon vouchers, paid overtime and flexible working hours.

Altogether, a very nice package. But remember that we're an ambitious company. We want ambitious people, specialists with real skill and genuine ability; who can take full advantage of our planned, progressive career structuring.

We want people who are a little bit out of the ordinary. A cut above the rest. After five years development with us, you'll have plenty to celebrate.

Why not telephone (01) 554 8899 and have a chat with John Parodi, Mick Chivers, Tony Ward or Des Cunnane.

Or write to Matthew Dickinson, Save & Prosper Group Limited, Arodene House, Perth Road, Gange Hill, Ilford, Essex.

SAVE & PROSPER GROUP



FACILITIES MANAGEMENT BUSINESS SYSTEMS CONTRACT STAFF SUPPORT RECRUITMENT CONSULTANCY  
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Payroll package specialist — East Midlands — 3-6 month contracts.

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A CCP/RPG2 Project Leader for long term City contract to **£300 p.w.**

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### PROJECT LEADERS SYSTEMS ANALYSTS ANALYST PROGRAMMERS PROGRAMMERS

It doesn't matter who you are or how much experience you have got if you want to move, promote yourself or perhaps it's time for a change.

Hexagon's permanent recruitment division can help. Here is just a small selection of our current client requirements.

### LONDON

Project Leaders £ Your asking price  
COBOL Programmers, banking to **£7,000 + travel**  
PL1 Programmers c. **£6,000**  
Systems Programmers from **£7,000**  
Assembler Programmers to **£6,600**  
Systems Analysts c. **£7,700**

### HOME COUNTIES

Project Leaders to **£8,300**  
Analyst/Programmers/RPG2 to **£7,000**  
COBOL Programmers to **£7,000**  
Analyst Programmers, Assembler to **£6,000**  
Systems Analysts to **£7,800**  
BAL Programmers to **£8,000**  
PL1 Programmers to **£6,500**

### WEST COUNTRY

Project Leaders c. **£7,000**  
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Assembler Programmers to **£5,500**  
Analyst Programmers to **£7,000**

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DOS/VS Operators — City — **£4,400**  
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OS/VS2 JCL Writers — Middlesex — **£6,200**  
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ICL Operators, GEORGE 2 and GEORGE 2+ — Herts, City and North London — **£5,500 p.a.**  
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# NEW SYSTEM, NEW OPPORTUNITIES...

U.K.O.

## SYSTEM BACKGROUND

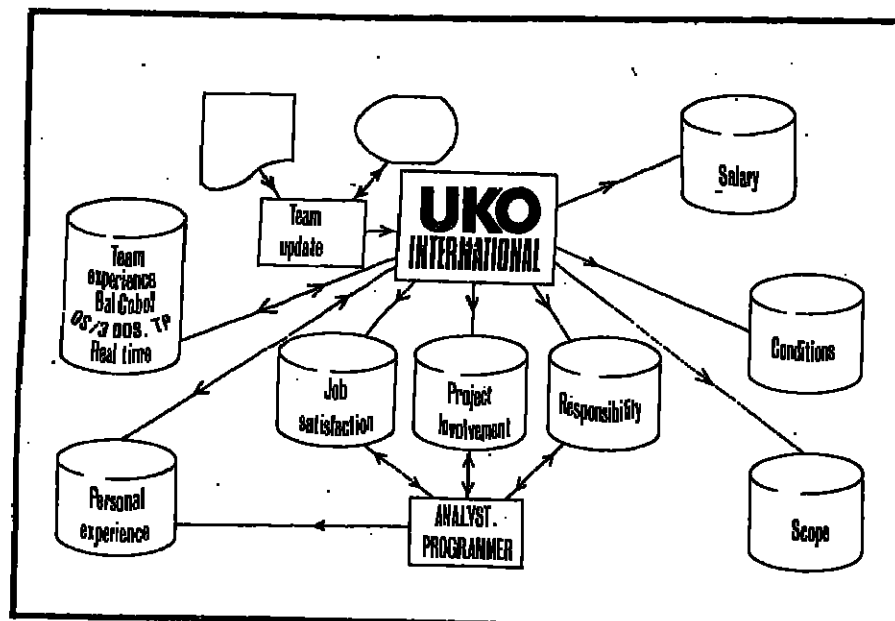
United Kingdom Optical is the country's largest manufacturer and distributor of lenses and frames in the British optical market. The Company also has interests overseas and enjoys a flourishing export trade. Since 1976 when the Group obtained a Univac series 90, a sophisticated real time order processing system has been developed and implemented. We are now seeking to expand our computer team before embarking on the Company's next phase of computer development.

## INPUT PREPARATION

We require analyst/programmers and experienced assembler programmers who feel they are ready to increase their areas of responsibility. We need people with a high level of self-motivation coupled with a desire and ability to become involved in all areas of system design and implementation.

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You will find yourself working for a Company dedicated to the continued expansion of its computer usage. Salaries are competitive and working conditions, which include



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If you feel your career is ready for some updates, and you have something to offer, then contact me at home or office and see what we can offer in return. Alternatively, write to me giving a brief outline of your career to date.

Contact: Brian Jones, Esq.  
Systems and Programming Manager

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## CITY OF GLASGOW DISTRICT COUNCIL CONTROLLER OF COMPUTER MANAGEMENT SERVICES

Salary Scale: £10,850-£11,378

The City of Glasgow District Council is one of the largest local authorities in Scotland with annual expenditure of £200 million.

At present it does not have major computer facilities of its own but extensively utilises, on an agency basis, the services of Strathclyde Regional Council and its large Honeywell Level 66/40 Computer.

A substantial extension of the council's use of computers is planned and the decision has been taken to establish a computer services department with an associated budget of £750,000-£900,000. A comprehensive systems development programme is being formulated and the successful applicant will be a principal participant. The new developments will make full use of interactive processing and database techniques using remote terminals located in major user departments.

The controller of computer services will report to the Director of Finance and will be responsible for all data processing activities within the district council. The successful applicant, ideally with a good degree or professional qualification, will have had considerable experience in data processing at a senior managerial level. Previous experience of database techniques, telecommunications, mini-computers and local government systems would be valuable.

Superannuation and life assurance schemes in operation, generous holidays, relocation assistance (where appropriate) available.

Please telephone 041-221 9600 extension 2042, for an application form which must be returned not later than 28th March, 1979, to the Director of Finance, City Chambers, Glasgow G2 1DU.

Please quote Ref. CW/11/79

## PROGRAMMERS

FOR

## ADVERTISING

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If you work in town and you are looking for a change, then consider the following:

- ★ DEC and IBM hardware
- ★ Training in RMS
- ★ On-line Systems for the Advertising Industry
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The heavy schedule of development projects will enhance your BASIC programming skills whilst gaining highly marketable applications experience.

Phone me, **GEOFF MARSH**, on 01-499 4501 to arrange an early meeting.

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## PROGRAMMERS

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+ BENEFITS

## JOIN IN THE SUCCESS OF TURNKEY SYSTEMS

Having been around for 13 years already puts my client on a very sound footing.

Currently they are developing turnkey systems in the Production/Stock Control and Order Processing areas. All of these systems are on-line and use mini computer hardware (micros under investigation). Working in small project teams, you will be involved in projects right through to implementation at the customer site. Progression to Analysis and Project Leading posts is dependent only on your abilities. So if you are ready for a move, or want to work nearer home, bring your COBOL experience to me, **GEOFF MARSH**, on 01-499 4501 NOW.

## WARRINGTON

European Data Centre — Large SNA Network

## PROGRAMMER

to £5,500 p.a.

## SYSTEMS PROGRAMMER £7,500

for

303X and SNA

## MOVE UP TO TELEPROCESSING

An additional COBOL Programmer is sought to join a small team embarking on major on-line development project using CICS. In addition to learning CICS there will be opportunities to be involved with a sophisticated international network using database and SNA software.

If you are determined to learn advanced IBM techniques and you are a competent COBOL programmer, call **GEOFF MARSH** on 01-499 4501.

## 1st Multidrop SDLC network in Europe

Very few companies will be using 303X and SNA in 1979. Consequently, here is a golden opportunity to add these skills to your existing VS1 'know-how'. The current installation is a 2 Mb 148 under VS1 with a European CICS network of c 85 VDU's with 3790's and 3705 controllers. It is designated by IBM as a "Leading edge" account, i.e. at the forefront of technology.

With the arrival of the 3031 the company is planning expansion into major database software, distributed processing and direct links to the U.S.A. It is also considering MVS. Your career progression is limited only by your own potential.

CALL **GEOFF MARSH** on 01-499 4501.

## ANALYST PROGRAMMER

£6,500

Some European travel for a Senior Programmer

Wishing to move into Analysis

The task is to design and implement major additions to Order Processing Inventory Control and Accounting Systems for the French subsidiary. All the systems are on-line and written in COBOL. Here is an excellent opportunity to gain analysis experience over a wide range of CICS applications areas.

Call **GEOFF MARSH** on 01-499 4501.

Our client is a \$ multi-million Corporation, whose European Data Centre is situated overlooking a golf course in a Science Park setting. The site is easily accessible by major roads and office accommodation is

to the highest of modern standards. The management is young and go-ahead, and able to reward company employees through very attractive, above market salary scales.

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If you are an established "straight ironware" salesman and identify with the sort of products sold by companies such as ITT, MEMOREX, OLIVETTI, KODE, CASE, CREED, HARRIS, etc., then we have something very interesting to discuss. If you do not have this experience but feel your background equips you to sell successfully in this fast moving market place then we would still be keen to meet you!

TELEPHONE BOB BOWER A.S.A.P. TO ARRANGE A MEETING. DO IT SOON, YOU HAVE NOTHING TO LOSE AND A GREAT DEAL TO GAIN!

Reference CW 339/1

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TELEPHONE: 01-353 7141 (24 HOURS)

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## SALES MANAGEMENT

MIDLANDS

LONDON

## COMMUNICATIONS AND DISTRIBUTED PROCESSING

CIRCA £17,000 p.a.

Two vital appointments are to be made within the next four weeks. Both at Branch Sales Management level, these positions have resulted from expansion and a redefining of market areas, product areas, and general sales strategy.

Our clients enjoy an excellent reputation in the fields of communications and distributed data processing and can offer a rewarding career with clearly defined promotion prospects.

Current Sales Managers or Senior Sales Executives aspiring to management are encouraged to apply. An intimate knowledge of the Computer Industry and particularly the areas already described are of paramount importance.

WE ARE WORKING TO A TIGHT DEADLINE SO INTERESTED CANDIDATES SHOULD TELEPHONE THE ADVISING DIRECTOR, BOB BOWER, AS SOON AS POSSIBLE.

Reference CW 339/2

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TELEPHONE: 01-353 7141 (24 HOURS)

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## SYSTEMS ANALYST up to £6500 p.a.

A systems analyst is required by Barclays Unicorn Group Limited, a leading Unit Trust and Life Assurance Company, at their East London Head Office.

The position requires a person with the ability to motivate others. The analyst will be responsible for the development of commercial systems to support the expansion of the Life Assurance side of the Group's operations. He/She will be seeking to enlarge his/her experience in a financial environment and to be in a position where practical ideas can be put to good use.

We use an ICL 1904A under George III while a changeover to a 2900 system is being considered. We are planning to install a large mini-computer later this year.

The successful applicant will need sound systems experience and will probably have gained this in a commercial background. Knowledge of ICL 1900 Disc and Cobol and/or Life Assurance systems will be advantageous.

The salary range is £5000-£6500 p.a., plus productivity bonus. As a Barclays Bank employee, the conditions of employment and fringe benefits are substantial and include a non-contributory pension scheme, staff restaurant and luncheon vouchers, 5 weeks' holiday, a profit-sharing scheme and also a special house-purchase scheme.

Applications should be made in writing to:

**Staff Department,  
Barclays Bank Trust Company,  
Juxon House, 94 St. Paul's Churchyard, London EC4N 8EH.**

**BARCLAYS**

city of  
canterbury

### Systems Analyst/ Programmer

Salary £3,732-£5,073 (inclusive)

Applications are invited for the above position at the Council's purpose-built computer centre on the outskirts of Canterbury. The Council have an ICL 2803 computer which is linked to the main Council Offices for on-line VDU enquiries. Further on-line systems are planned and the person appointed will become involved in the area (with training given where necessary). A sound knowledge of COBOL using Direct Access techniques is essential and experience in NICOL and ICL software utilities would be an advantage. Commencing salary related to experience.

Consideration will be given to housing accommodation and a generous disturbance allowance scheme is in operation. Closing date 27th March, 1979. Interview date 5th April, 1979.

Application forms may be obtained from the Personnel Officer, 3 Marlows Avenue, Canterbury, Kent CT1 2QM. Telephone: Canterbury 51755, ext. 12.

## Exciting New Microprocessor Development Programmers

North London

To £6500

Our client, part of a large multi-national group is currently developing a new range of highly sophisticated communications equipment.

The equipment is built around a new central communications processor and uses microprocessors as control units for the peripherals.

They now need Programmers to participate in the detailed design and development of the new operating system and its applications software. Successful candidates can expect to be closely involved with users, hardware engineers and OEM suppliers in developing this exciting new project.

Suitable candidates will possess in excess of 18 months experience working on projects such as air traffic control, flight simulation, weapons guidance or specialist software development. Experience in working in a small project team environment is desirable. Essential is solid programming experience in one of the following languages: Assembler, CORAL, ALGOL, PASCAL or FORTRAN.

Ideally, candidates will be aged 22-26 with a degree in engineering, science or mathematics and have the presence and ability to liaise with the various interface points in the project team.

The company offers a good range of benefits which includes full relocation and temporary accommodation if necessary.

To discuss these exciting new opportunities further contact Morley Holliday or write in strictest confidence quoting reference MGH 2126.



**Lloyd Chapman  
Associates**

123, New Bond Street London W1Y 0HR 01-408 1670

## Programmer

N. London, to £6,000

This major international manufacturing company intends expanding the DP facilities at its North London Head Office and is currently evaluating new equipment to replace the heavily overloaded IBM 370/115. TP and distributed processing feature prominently in the plans. In anticipation of these developments a new position has been created for which we require a

young enthusiastic programmer ideally with two or more years COBOL experience. The successful candidate will immediately become involved in the redevelopment of existing applications designed to achieve a fully integrated system. Career prospects are excellent with this progressive organisation and there is an attractive range of fringe benefits.

E. Sutton, Ref: 17057/CW

Male or female candidates should telephone in confidence for a Personal History Form to: LONDON: 01-734 6852, Sutherland House, 5/6 Argyll Street, W1E 6EZ.

**Hoggett Bowers**  
Executive Selection Consultants  
BIRMINGHAM, CARDIFF, GLASGOW, LEEDS, LONDON, MANCHESTER, NEWCASTLE and SHEFFIELD.

## SYSTEMS ANALYSTS AND ANALYST/PROGRAMMERS GREECE

KHYKY is the Central Computing Centre for all Welfare and Health Services in Greece.

### A. System Analysts

KHYKY seeks graduates with a minimum of 4 years' experience in the design and implementation of commercial or administrative computer applications for immediate employment as Systems Analysts to be involved in a variety of projects.

Post graduate studies in computer-related subjects will be a definite advantage.

The form and terms of employment will be commensurate to the applicant's experience and qualifications. For details write to:

**KHYKY  
Computer Center of Social Services  
101 Syngrou Avenue, Athens, Greece  
or ring ATHENS 9227.098**

Applications should be submitted by the 15th of March, 1979. Applications received after that date will be considered in relation to future needs of KHYKY.

### B. Analyst/Programmers

KHYKY seeks graduates with qualifications in System Analysis and Programming to fill 4 established positions in the specialization of Analyst/Programmers.

Selection will be by examination. Applications and enquiries should be made to the same address as above. Applications should be submitted by the 30th of March, 1979.

## BOLSOVER DISTRICT COUNCIL

### FINANCE DEPARTMENT SENIOR SYSTEMS ANALYST/ PROGRAMMER

(Based at Mansfield)

Grade APS Salary £4,773 to £5,073 (inc. supplement)

The Authority will be installing a Nixdorf 8870/6 computer in August 1979 to replace its existing computer. When the present conversion of systems is completed, an extensive programme of development of on-line systems is planned.

The Council require a Senior Systems Analyst/Programmer to participate in this development programme and the applicants should have experience in the design, programming and implementation of both financial and non-financial applications. Experience in the use of Cobol is essential and training will be given in the use of Nixdorf software.

Full removal expenses will be paid and temporary housing accommodation will be considered in appropriate cases.

Closing date: 28th March, 1979

For more details, application form obtainable from:

Personnel Department  
100 Churchfields Road South  
Mansfield

## COMPUTER PERSONNEL REQUIRED PROGRAMMER

Up to £5,500 p.a.

Applicants should be aged 23+ and have at least 3 years' BAL experience. Preference will be given to IBM operating background. Hours: 9 a.m.-5 p.m.

## COMPUTER OPERATOR

Up to £4,500 p.a. plus shift allowance

Candidates should have experience in operating 360/370-IBM systems. A thorough knowledge of JCL is essential.

Shifts are: 12 midnight-8 a.m.  
8 a.m.-4 p.m.  
9 a.m.-5 p.m.

The above positions carry full staff benefits including: DEC Pension Fund and Life Assurance Schemes.

For an application form please contact:

The Personnel Department

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Telephone: 01-592 6611

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an associated company of the Hambro Bank Group of Companies

That's why we need that rare breed of analyst to do the job: part consultant part entrepreneur; above all a practical problem-solver. You're worth up to £9250 as an established analyst with at least 5 years systems experience, from £5000 to £9000 as an up-and-coming analyst with at least 2 years systems experience, or from £1000 to £1500 as a graduate just moving into full-time systems work. At the top level, a company car is provided.

Realistic salary levels are just one aspect of a whole company philosophy which you'll find refreshingly different. We're young, businesslike, believe in hard work and recognise achievement with real rewards, not just status symbols. And we promote on merit and merit alone.

We haven't forgotten that location is one of the most important things in life too. We settled on Swindon for our modern Administration headquarters not only because it gave our business the amenities, communications and room to grow it needed, but also because it gave our staff the opportunity to live in one of Britain's most attractive regions, in towns or villages set in the rolling Wiltshire countryside. Amongst our full range of benefits is generous assistance with making the move here.

For our comprehensive booklet and an application form contact: Liz Gibney, Hambro Life Assurance Limited, Hambro Life House, Swindon SN1 1EL. Tel: 0793 27812 (24 hour service: reverse charges during office hours).

## CONTRACTS HOLLAND

Nixdorf Assembler  
IBM Systems Programmer with managerial experience  
IMS Analyst  
IBM Assembler TROPICS

## FRANCE

PDP RSX11 M or D  
RSTS/E  
Macro  
Basic 4  
Mini Assembler

French Speaking

## N. ITALY

Communications Network Designer  
Mini Assembler Message Switching

## U.K.

IBM Cobol OS Programmer  
Financial Systems Analyst  
PL1 Programmer with CICS or Shadow or good T.P. experience  
H 6000 CBL Programmer  
S/A Production Control  
IBM CBL/BAL Programmer  
IBM Sys. 3 RPG2  
M 6800  
Intel Assembler  
IBM CBL DOS Programmer

These are just a few of our current requirements. For information about these and other opportunities we have telephone Stephen Trigg or Jacalyn Homewood on:

**BRENTWOOD (0277) 212021**

LINSCOTT COMPUTER SYSTEMS LIMITED, P.O. BOX 74, BRENTWOOD, ESSEX CM15 0BZ

**LINSCOTT**  
Computer Systems Limited

We also have many permanent positions which may be of interest to you. For further information about these contact Martin Wajon at the above.

**William Key**

## U.K. OR U.S.A. CAREER PROSPECTS

This successful turnkey systems house are expanding their U.K. and U.S. operations.

The Company are operating on DEC hardware and have specialised in banking, MIS and communications information services. They require:

<b>Team Leader</b>	
<b>Analyst/Programmers</b>	c £7,500
<b>Systems Programmers</b>	c £6,000
<b>Applications Programmers</b>	c £6,000

to join the U.K. operation, but with career prospects internationally.

These jobs range from junior programmer to team responsibility - to qualify you obviously have to have a good programming background, with preferably some experience of real-time, on-line or T.P.

If you are interested in following up any of the above please write or telephone Jenny Dalrymple-Hay quoting reference C9732 on 01-493 2947 during office hours or on Betsonsfield (04946) 4579 evenings and weekends.

**WILLIAM KEY & PARTNERS LTD., A HALF MOON STREET, LONDON, W1**



## International Systems Support Manager

Raychem Corporation has a vacancy for an International Systems Support Manager in its management information systems department based in Brussels, Belgium. The position consists of managing a staff group of computer specialists, that provide technical support services to Raychem in the following areas:

- Burroughs large system computers,
- datapoint minicomputers,
- operating system software,
- data base software,
- telecommunications,
- technical utility programming,
- user consultation and training.

The ideal candidate would have a university degree and currently be managing a technical support group, preferably at a large system Burroughs installation.

Raychem is a multinational company with a leading position in the field of radiation chemistry. The European head office in Brussels has a dual-processor B-6700 and controls a growing network of minicomputers in several European countries and interlaces with a similar system in Raychem's headquarters in California. The position will suit a person who is self-motivated.

Belgium offers many advantages. Very favourable tax regulations exist for foreigners. There is always a large selection of houses/apartments available for rental. There are several English speaking schools, and the company will pay any school fees.

The starting salary of c. pnds 20,000 per annum and fringe benefits (such as profit sharing) are commensurate with high level of ability. Removal expenses will be paid by the company.

The first interviews will be held at one of Raychem's UK offices.

For confidential consideration, please send details of your career to H. Westbrook, Corporate System Support Manager, Leuvensesteenweg 31, B-1940 St-Stevens-Woluwe, Belgium.

# Raychem

## COMPUTER FINANCING

Specialists in New and Used IBM Computers and tailored Leasing Plans

## require SALES EXECUTIVES

£15,000 +

We are a young dynamic and very professional company dealing in the Brokerage and Second User Market for IBM 370 range of computers and peripherals. We are currently looking for two Sales Executives who will be required to call upon IBM users throughout the UK and will report directly to the Sales Director.

**Basic Qualifications** — Enthusiasm, ability, self-motivation and above all someone who's not afraid of hard work. Knowledge of IBM computers and peripherals is desirable, but not absolutely essential as we have technical support available.

A second language is useful, as we are an international company and some overseas travel may be inevitable.

**Rewards.** Good basic salary plus high commission should generate earnings in excess of £15,000 per annum. Company car available. Excellent working conditions and all the usual benefits associated with a young company.

Interested parties should contact Stephen J. Measures, Sales Director.

Computer Financing  
Standbrook House

2-5 Old Bond Street, London W1X 3TB  
Telephone: 01-499 7955 or 01-491 4153

## Database Specialists Project Managers to £10,000 plus car

# Unlimited territory for a very rare species

A leading company needed a nationwide computer system — to be developed from scratch to handle its entire sales, service, spare parts and accounting functions. Perhaps a network of ten dispersed minicomputers would provide the most economic solution. Perhaps more than twenty. Could you evaluate a requirement like that? Or design the distributed database?

A police force required a powerful online system — to hold a large number of records with complex linkages. Could you design the database, or the highly flexible enquiry language necessary? Or estimate the response times under widely differing loads?

Both projects involved the development of complex applications and systems software, the procurement and supply of computer and communications hardware, extensive client liaison and performance to stringent time and budgetary conditions. Are you currently managing a project as demanding as that? Or could you do so, given the chance?

**DATABASE SPECIALISTS** Data Logic is looking for consultants and system designers for these and similar projects. Current assignments include database oriented projects for banking, manufacturing and distribution, and public sector organisations. Technically, the scope of work should give unlimited opportunities to the right people.

The experience and personal qualities we need are extremely rare. Preferably, candidates will have a degree in computing science or a relevant discipline. Candidates will have spent at least five years on the design and implementation of database management systems — on minis or mainframes. Ideally this will have been with a computer manufacturer or a software

product company, although work with a software house or a major user of an online database system will also be of interest. Candidates will have the ability to work with a minimum of supervision and to deal effectively with senior management in client companies. Detailed knowledge of one of the following will be a distinct advantage: IMS/DL1, TOTAL, DMS2, IDMS, IDS, ADABAS. REF PS/09

**PROJECT MANAGERS** Our projects need the best managers to manage them. Our continued successful expansion, and the growth of our work into fresh areas of application and technology, depends crucially on our project managers. Consequently, their career development is as rapid and as rewarding as you will find anywhere.

Preferably, candidates will have a degree in computing science or a relevant discipline. They will have spent at least five years on the design and implementation of online systems — on minis or mainframes. We require at least two years experience of project

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## THE SALES AND MARKETING BIT

## A vital source of information

ONE often hears the cry "Everybody sells," and I am sure that is a slogan we all applaud. Yet one seldom comes across a corresponding enthusiasm for everyone to produce call reports.

Call reports are essential documents for instigating actions and recording history. Time after time the existence of a call report proves to be the only source of information concerning what was agreed or said at some meeting that took place in the dim and distant past. Sometimes the only way the marketing department is made aware of an aspect of competitive activity is by a circulated call report.

In this column we recently discussed the importance of producing a call report no later than immediately after the call. Let us now look at the call reporting process in terms of its broad application.

A call report should be produced for every face-to-face contact with a client, irrespective of the venue. Telephone contacts should also be reported in the same manner whenever a significant topic has been discussed.

Call reports are essential wherever agreement to take action of any kind has been made, and especially if such commitment affects other people in addition to the generator of the report.

It is essential that everyone within a sales and marketing environment realises the importance of the call report is not limited to the salesman's domain.

Of course, if these disciplines are to be followed a call reporting system needs to be simple.

One of the questions within the structured interviewing system my com-

pany's recruitment division uses for evaluating salesmen, is one which asks the candidates to identify his greatest weakness in the context of selling skills. Invariably the answer is related to an abhorrence of paperwork. It is, therefore, unfortunate that many companies operate a call reporting system which gives the impression of an entrance examination for Mensa.

Some sales organisations in their megalomaniac quest for information create sales data collection systems which have the unfortunate knack of creating the very opposite effect to the one intended.

From the salesman's point of view, a call reporting system must provide the maximum effect with the minimum of effort, whether the outcome be action or merely imparting information. If much of this can be done by merely ticking boxes (type of call, products) discussed, copy to, etc.) so much the better.

As far as the recipients are concerned (the sales manager, technical director, or whoever), the principal information needed is date, name of company, contact, a brief statement of the key elements of the call, action to be taken, name of the salesman. Any further detail should be produced only by way of formal request from those with a special interest.

The call report is an excellent device for keeping people up-to-date with client situations. If a salesman, by way of a tick, or stating initials, can ensure that all interested parties receive a copy of his report, the ensuing benefits substantially outweigh any risks of a paper flood.

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## BOOK REVIEW

Management methodology for software product engineering. By Richard Gunther. 379 pages. Wiley-Interscience.

THIS book seems especially suited as a textbook for managers, working in software, business service bureaux, and computer suppliers. It can usefully serve as a checklist for anybody who is concerned with the construction or maintenance of a product development methodology.

It would be a bible for the software product manager who is saddled with the responsibility for getting the product out, but who has no company standards upon which to base his work.

Finally, it would be a useful source of ideas for software products with less stringent requirements than Gunther presupposes.

It is well illustrated, and well organised. The author is practical in his approach. There is no blarney of the academic kind of the software engineering, computer science, growth.

This reviewer's heart was warmed by the clear and consistent use of an explicitly recognised management by objectives approach on page 47, which is followed up in stating product end goals such as

reliability, maintainability, and quality of human interface ("usability").

This essential element seems to be missing from most development methods I have seen, and is so scarce the TRV-Systems is the only really good exception.

In the interests of readers who might consider adapting the method for their own use, I would like to mention the following improvements: measurable quality objectives, deeper design inspection methodology and the use of automated aids in this process. All these things could enhance Gunther's methods.

TOM GILL

## Puzzle Answer

TAKE the cube with two adjacent blue faces, and place it on the table so that the blue faces top and front with red underneath. Then put the cube with two adjacent green faces next to it so that green is concealed from view at base and rear. Next in line comes the cube with just two adjacent red faces, placed green top, red front, yellow base and blue rear. Lastly we have yellow top, green front, blue base and red rear.



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## Ascii through the Logic Gate

An epic in 32K words, by Richard Forsyth  
Block 30 (Building Blocks)

Cleo has accidentally stumbled on the Future System in its huge underground cavern beneath the Sierra Nueva. Hex has been sent there deliberately by the DPM — who has forced him to rethink his ideas on his own ancestry. His task is to bring the Future System live ahead of schedule, now that the System is in the throes of a gigolite epidemic.

NEDDY the Sasquatch, Piltown's clone, conducted Cleo around the plant, describing each new wonder to her in Esperanto. She paid little attention. Rose's diagnosis of pregnancy had shaken her. He might be wrong; but he had nothing to gain by making it up, since it spoils his plans for her. She cast her mind back on Hex and on the single night of passion in the Inter-Block Gap which had landed her in this predicament — and, she realised, effectively ruined their friendship. While it remained platonic their relationship had been harmonious: as soon as a physical aspect crept in it had deteriorated.

Perhaps it was too much to expect an android and a human to get on in that sense; but at the time he had seemed very special — an android who had not forsaken his humanity. Then she had believed him capable of leading them into a brave new world. Now the romantic mist had dispersed and she saw him for what he was, an out-and-out opportunist.

She was a little disappointed with Nedly too. He seemed to have less of Piltown's spark of humour, and none of his defiance. Whereas Piltown had broken loose to roam the world, Nedly had stayed to assist his Frankenstein-creator. Although they were identical twins, they clearly differed in temperament.

When she returned to Rose's lab she was none the wiser. Rose was again at his workbench, hunched over a microscope. He looked up as they came in.

"So you've finished your semiconducted tour," he observed wryly.

"Yes, thank you."

"Nedly pointed out all the highlights, did he?"

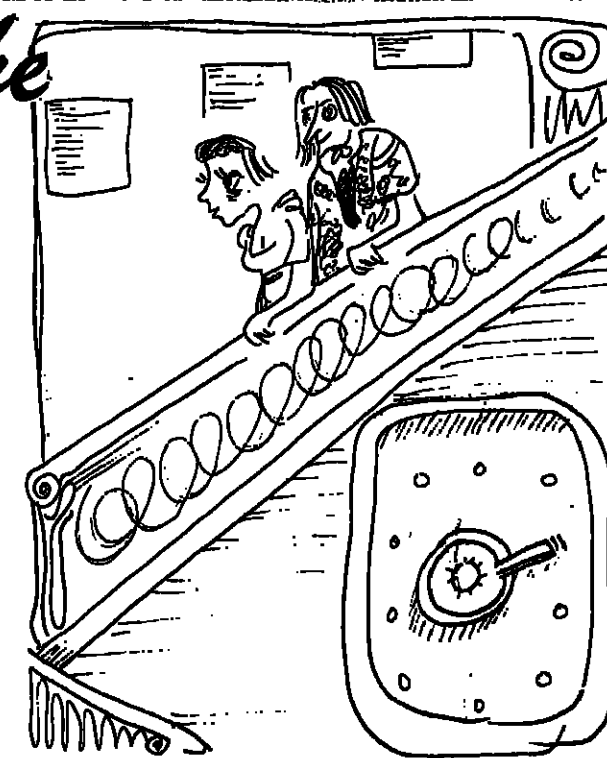
"Yes. But I didn't understand a word."

"All Greek to you, I suppose."

"Greek I can manage," she replied. "Esperanto's the language barrier."

"Hmm. Well, you can't stay."

"Can I go back to the surface?"



"No. You will have to be disposed of."

There was a pause. Cleo waited for him to spell it out.

"I'm handing you over to my superiors," he concluded at length.

"I thought you were in charge."

"Here, yes. But you're not wanted here. I'm packing you off to Fort Ranfour. Come this way. There's a subway link."

He led them out again. They threaded their way among the bustling automata down several flights of stairs. They came to a massive steel bulkhead which swung open noiselessly on his approach. Passing through, they entered the terminus station.

"This is our link with the outside world," said Rose. "We're in luck: there's a train coming. Nedly will accompany you on the journey. Then the DPM can decide your fate."

He spoke a few sentences in Esperanto to the apeman. Then the railcar arrived. McNull stepped out, followed by Hex.

"Who are you?" demanded Rose.

Hex and Cleo gaped at each other open-mouthed.

"I said: who are you?" repeated Rose.

McNull answered first. "It came to pass in the last days of the System that a great pestilence raged over the land. And

in those days travelled the chosen android and his disciple, from the heart of the Old System unto the birthplace of the new. . .

"We've been sent by the DPM," interrupted Hex, emerging from his trance. "I am the Hexadecimal Kid and this is the Wizard of Os. We're software consultants. We've come to help you get this thing off the ground."

Rose's eyes narrowed. "Where are your credentials?"

"We haven't any. There wasn't time," explained Hex.

"The System is going gigolite."

"What? I've heard nothing of this."

"All data communication has been cut in an attempt to stop it spreading," Hex replied. "We must get the Future System running before it's too late. Lead us to the command console: there's no time to lose."

Rose laughed. "I like it: two jokers calling themselves consultants turn up with some half-baked story and not an ID-card between them demanding to go straight to Mission Control. I have to admire your effrontery."

Hex saw they were getting nowhere. As a last resort he tried the cryptic pass-phrase which the DPM had instructed them to use: "Two years' Cobol experience".

Rose's expression changed. "Now that's quite another matter," he said deferentially. "Why didn't you say so in the first place? Come with me and I'll show you what to do."

When they were all back in his lab he asked Hex, "How much do you know about the project?"

"Only that the Future System is called BOSS, for Bionic Operating System Supervisor."

"I'd better begin at the beginning," responded Rose.

"Originally I was a neurophysiologist, but I got bored with cutting brains out of monkeys. I wanted something more creative."

"Such as putting brains into monkeys," Cleo suggested, glancing at Nedly.

"Exactly. I started messing about with electronics. But you'll notice that Nedly is not an ordinary android: he has no electronic parts. You see, I grew convinced that silicon chip technology had neared its limits. I sought a purely biochemical alternative. There's more organising ability in one protein molecule than in a whole slab of silicon. I turned from microprocessors to micro-organisms. In short, I began to dream of the self-reproducing computer."

"So when the System was recruiting for the Advanced Systems Group they selected me. I joined, and eventually became director. Now I am the only one left, apart from robotic functionaries. The development phase is being wound down; it has almost reached its conclusion. We have made the ultimate biotechnical breakthrough."

He turned round and picked up a flask of clear fluid.

"Look," he declaimed, "a programmable virus! There's enough information in its DNA to turn an elephant into an IBM 360."

"Not the other way around?" queried Cleo innocently.

What witch's brew has he concocted? Next week the cauldron boils over.

1979 Richard Forsyth Book

## BOOK REVIEWS

### Even minimisation is kept well in view!

Digital circuits — a preparation for microprocessors, by Charles McKay. Prentice Hall International, 68 Wood Lane End, Hemel Hempstead, HP2 4RG. 386 p. £13.10.

THIS is a beautifully presented textbook which could be used either as the basis for a university or polytechnic course, or for self-tuition. Each section includes question-and-answer material so that the book can be regarded as a programmed-instruction text.

The book works from the top down. It starts with the assumption that the reader is interested in computers and numbers rather than in Ohm's Law, and the introduction establishes the principles of mapping numbers on to electronic logical devices.

In Chapter 2, we are introduced to point set theory: Chapter 3 shows how Boolean functions are realised by gates, and the book then moves gradually deeper into the problems of using electronics as the vehicle for logical manipulations: minimisation, normalisation, use of Karnaugh maps, then, in Chapter 11, the practical problems of timing, error detection and correction etc are covered.

In Chapter 14, we are ready to look at the whole purpose of what has been done so far: the use of the circuits for arithmetic.

Finally the book considers the devices currently available and some of the applications.

In some ways the book goes deeper into computer architecture than the average computer scientist needs. Today, particularly in the UK, the number of computer professionals who will actually design a CPU is very small, probably smaller than it was some years ago, ironically enough as a consequence of the microprocessors mentioned in the title.

So to some extent it is of academic interest to see just how an accumulator is constructed from logic elements, and the logic elements from electronic ones.

However, the understanding provided by the book will help those who, while not in the business of designing integrated circuits, are very much in the business of joining them together into systems. And this is a booming area, even in the UK.

Those who previously were software specialists are now, if they are sensible, re-educating themselves in hardware, because it is

cheaper nowadays to solve problems by adding cheap hardware than expensive software.

I was hoping to find something to quarrel with in the book, and eagerly turned to the passages on minimisation, which traditionally have been concerned with techniques for cutting down the number of gates to realise a

given function. This is now old-fashioned, since it is cheaper to provide extra gates than extra connections. But I was disappointed, the concept of cost minimisation is kept well in view.

Recommended for electronic engineers — and for those of us who feel that one day we really ought to get down and understand

the machines we make our living out of.

D. J. P. A. RACE, Brunel University

### Tilting at compiler design windmills

Principles of compiler design, by A. V. Aho and J. D. Ullman. Addison-Wesley Publishing Co Inc, 11 Hills Place, London, W1. Tel: 01-734 8817. £15.20.

WHAT may first attract you to this book is the coloured picture on the cover. The eye is immediately caught by a giant fire-breathing green dragon labelled "complexity of compiler design".

Also depicted is brave St. George carrying the shield of "syntax directed translation". He is riding his trusty steed called "dataflow analysis", and with his "LALR parser generator" lance he is ready to do battle with the monster.

After talking in the context of this book, and closing the book cover, the

picture has changed to Don Quixote on Rozinante and (looking through Sancho Panza's eyes) we see that there was no dragon, he was only tilting at windmills after all.

The authors are trying to suggest that while the task of writing a compiler for a general purpose language is not trivial, it is in fact less difficult than is generally thought.

Their book is certainly easier to read than Greis', against which it will no doubt be a major competitor. Like Greis, the authors write their book on their local computer and it was merely reproduced by the publishing company. However, since Aho and Ullman have a photocopier and the excellent software



Dr Race

the machines we make our living out of.

D. J. P. A. RACE, Brunel University

### Appeal to DP science students

Structured programming and problem solving with Pascal, by Richard Kiebert. Prentice Hall International, 68 Wood Lane End, Hemel Hempstead, HP2 4RG. 385 pp. £8.

THIS book is not for those who have already read Kiebert's earlier volumes based on Algol W and PL/I or those who might expect to learn Pascal from this one.

The material is essentially the same and the series might almost have been generated by a macro processor. Had it been so, many irritating typographical errors would have been avoided.

According to the preface, the programming language is incidental to the main theme and there are few "digressions on the details of usage" of Pascal.

There are chapters on most of the topics one would expect in a work on structured programming, but the ordering and emphasis do not always seem quite right.

For instance, compound statements are introduced not in the context of abstraction but as a syntactic requirement of conditional statements.

A "disproportionate coverage is given to arrays, yet the treatment of records is meagre. Pointers are not discussed at all."

The greatest value lies in the many worked examples. However, many of these will appeal mainly to computer science students who tend to be more mathematically oriented than computing practitioners at large.

The value of the many exercises and "self-check" questions is greatly diminished by the absence of solutions.

DR ROGER STONE, Brunel University

RON KERR, Newcastle University